ESKOM TRANSMISSION

Eskom Thyspunt Transmission Lines Integration Project – Northern Corridor

Final Environmental Impact Report
DEA REF: 12/12/20/1212

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For:	Eskom Transmission

The Independent Environmental Assessment Practitioner:

We, SiVEST Environmental, declare that we –

- act as the Independent Environmental Assessment Practitioners in this application for the proposed Eskom Thyspunt Nuclear Integration Project in the Eastern Cape;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2006;
- have no, and will not have any vested interest in the proposed activity proceeding;
- have no, and will not engage in, conflicting interests in the undertaking of the activity; and
- will provide the competent authority with access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not

ESKOM TRANSMISSION

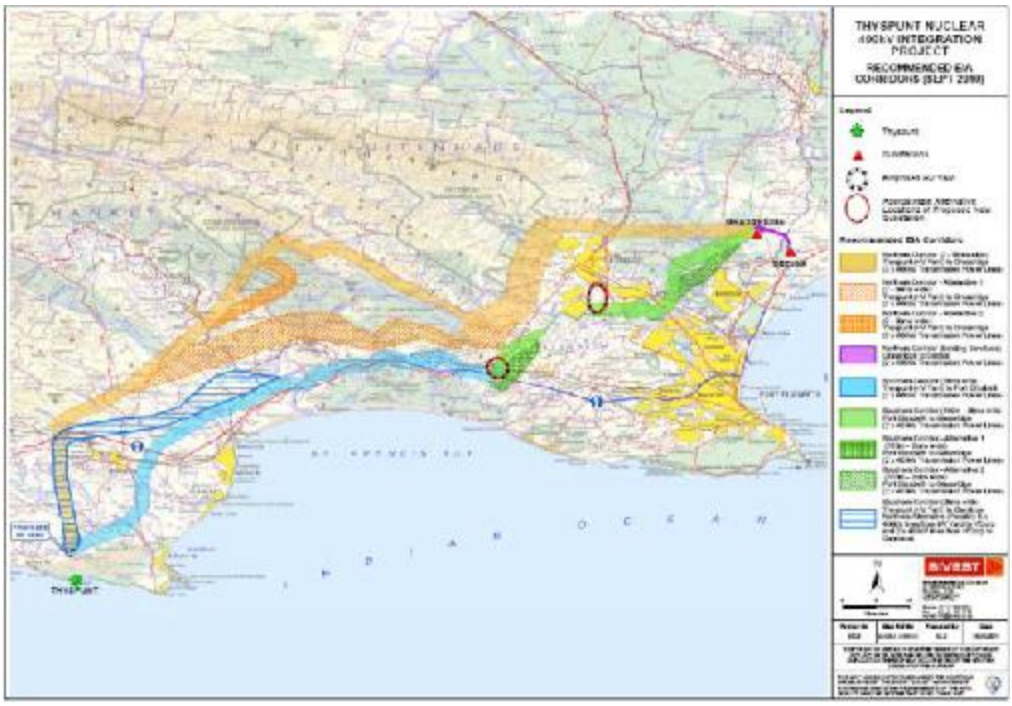
THYSPUNT TRANSMISSION LINES INTEGRATION PROJECT – NORTHERN CORRIDOR

FINAL EIR

Executive Summary

Eskom Transmission appointed SiVEST to undertake the EIA for the proposed Thyspunt Transmission Lines Integration Project (TTLIP) in the Eastern Cape Province. The project entails the installation of Transmission power lines, the upgrading of existing substations and the development of the proposed Port Elizabeth (PE) Substation. The proposed power lines would allow the electricity generated at the proposed Thyspunt nuclear power station (should this be authorised and developed) to be transmitted into other parts of the Eastern Cape and South Africa via the transmission grid, and in particular to supply the Nelson Mandela Bay Metropolitan Municipality (NMBMM) with increased power (through the proposed PE Substation) to meet future identified electricity supply needs.

The overall project includes two corridors (referred to as the Northern Corridor and Southern Corridor) that have been proposed for the TTLIP. The corridors are not alternatives to each other, as they are anticipated to be utilised by Eskom to carry a total of 5 X 400kV lines from the proposed nuclear power station. The proposed Northern Corridor transmission lines (3 X 400kV lines), and addressed within this report, run from the High Voltage (HV) yard associated with the proposed Thyspunt Power Station to the existing Grassridge and Dedisa Substations which are located in the Coega Area. The proposed development triggers a number of listed activities under GN R386 and GN R387 of 21 April 2006 (as amended) published under the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA). An EIA is thus required in order to obtain environmental authorisation to undertake the listed activities. The National Department of Environmental Affairs (DEA) is the competent authority on this application. The map below shows the location of the corridors at the start of the EIA phase. A3 high definition maps with better resolution are included in Appendix 13.



Map 1: Locality Map (Northern and Southern Corridors and PE Substation alternatives at the start of the EIR phase)

The Northern Corridor provides adequate space for a number of potential alternative alignments to be located within it. In a section of the Northern Corridor (in the Longmore Area) three distinct alternatives were presented for assessment in the EIA phase, due to complex issues within that region. The full EIA corridor was also narrowed from the scoping phase corridor (which was typically ~5km in width) to an approximate 2km width. There are certain points along the corridor where the corridor has been narrowed to avoid sensitive areas. The study area, as indicated above, indicates the boundary for the identification of stakeholders and for specialists in which their environmental studies were undertaken for this proposed TTLIP.

The following specialist studies were conducted for the EIR Phase:

- Geology and Geohydrological Assessment
- Avifaunal Assessment
- Surface Water Assessment
- Biodiversity Assessment
- Visual Assessment
- Socio-Economic Assessment
- Tourism Assessment
- Heritage and Palaeontology Assessment
- KhoiSan Heritage Assessment
- Agricultural Potential Assessment
- Desktop Geotechnical Assessment for proposed PE Substation Location

Specialist studies were conducted to address the potential impacts relating to the proposed development. Impact assessment was conducted to ascertain the level of each identified impact, as well as mitigation measures which may be required. The potential positive and negative impacts associated within these studies have been evaluated and rated accordingly. The results of the specialist studies have indicated that fatal flaws are present in certain parts of the corridor from a Visual and Tourism perspective.

Table 1: Summary of major findings

Environmental Parameter Assessed	**Potential Impacts**	**Recommendations/ Mitigation measures**
Biodiversity Assessment	▪ Loss of habitat for red data and general species; potential loss of species richness, edge effect, transformation and erosion during the construction and operation phases. No fatal flaws present.	▪ Detailed walk down to each tower must be undertaken before construction and by the appointed EMPr biodiversity specialist. ▪ All surface water features i.e. rivers and wetlands to be spanned as far as possible and towers located out of their buffer zones as assigned by the wetland assessment.

Environmental Parameter Assessed	Potential Impacts	Recommendations/ Mitigation measures
		▪ Clearing must be limited in areas of intact vegetation. ▪ Areas of poorly protected vegetation should be preserved as much as possible. ▪ Operation site-specific mitigation measures must be implemented (details in full report).
Avifaunal Assessment	▪ Collision with overhead cables during operation. ▪ Habitat destruction during the construction and maintenance activities will affect various species. ▪ Nesting of birds (positive impact on birds). No fatal flaws present.	▪ Fitting anti-collision marking devices onto certain critical spans. ▪ Minimise the impact of habitat destruction during the construction phase. ▪ During the avifaunal "walk through" prior to construction, any nesting sites of the mentioned species will be identified and case specific recommendations provided. ▪ All towers with available perching space (Self support) above conductors, along the lines should be comprehensively fitted with Bird Guards.
Surface Water Assessment	▪ Disturbance of wetlands / other surface water resources if towers are placed within the surface water feature hence degradation of the resource quality. ▪ Construction of roads through surface water features could lead to physical damage. ▪ Inappropriate construction techniques could impact surface water features, especially in the rivers and streams in the Longmore area which are highly sensitive. No fatal flaws present.	▪ Alignment should avoid all wetlands too wide to be spanned as far as possible. ▪ No new roads / accesses should be constructed across any surface water features. ▪ Particular care should be taken to prevent erosion and siltation into watercourses; the rivers and streams in the Longmore area must be strictly treated as no go areas. ▪ A desktop and in-field assessment of certain wetlands in the western part of the study area is recommended. Detailed maps indicating the specific wetland sites in the western third of the Northern

Environmental Parameter Assessed	Potential Impacts	Recommendations/ Mitigation measures
		Corridor are included within Appendix 5 of the FEIR, under maps.
Geology and Geohydrological Assessment	▪ Erosion of soil due to excavation, especially in areas of steep slopes and in soils with low clay percentage. ▪ Removal of vegetation and topsoil leads to erosion, siltation, affecting soil formation processes. ▪ Pollution of underlying aquifers during the construction phase. ▪ Potential damage to lines and towers located along the Coega fault if seismological activity were to occur. No fatal flaws present.	▪ Minimise disturbance of natural vegetation. ▪ Zones directly adjacent to Coega fault should be avoided – a 300m buffer to be maintained. ▪ Towers in this buffer zone must be subject to geotechnical risk assessment. ▪ Rehabilitate soil and vegetation. ▪ Implement effective erosion control measures. ▪ Avoid areas of higher yielding aquifers and shallow soils, underlain by rock types with favourable aquifer attributes.
Agricultural Potential Assessment	▪ The loss of agricultural land and / or production. ▪ Soil erosion caused by the construction of the various towers. No fatal flaws present.	▪ Negotiations with applicable landowners regarding final alignment of towers on their agricultural land. ▪ Employ a low impact routing to avoid / skirt high value agricultural land. ▪ Stabilise disturbed areas.
Visual Assessment	▪ Negative visual impacts on sensitive receptor locations ▪ Lines would be highly intrusive and could alter the visual environment and degrade the 'sense of place'. ▪ By compromising the aesthetic quality of the area, many outdoor-based tourism activities could be compromised. Fatal flaws present in the Elands River Valley area.	▪ Avoid the sensitive receptor locations and visually sensitive areas. ▪ Final route should be based on the EIA Team-preferred alignment as far as possible. ▪ No routing over hills, koppies or ridges where it can be avoided as far as possible. ▪ Avoid areas of intact thicket vegetation. ▪ Do not clear the servitude of bush in areas of intact thicket vegetation.

Environmental Parameter Assessed	Potential Impacts	Recommendations/ Mitigation measures
Tourism Assessment	▪ Visual intrusion of power lines in sensitive tourism areas could adversely affect the tourism product and potential for tourism development. ▪ Land use change. ▪ Corporate demand likely to slightly increase. Fatal flaws present in the Elands River Valley area.	▪ Areas with significant tourism facilities in the study area should be avoided completely.
Heritage Assessment	▪ Pre-colonial: Stone Age sites: Physical disturbance of the material. ▪ Colonial Period – farmsteads: Features are subject to damage. ▪ Colonial Period – industrial heritage: Different features are subject to damage. ▪ Physical disturbance of graves, cemeteries and burial grounds. No fatal flaws identified.	▪ All heritage sites should be avoided as far as possible. ▪ Isolate known sites and declare them as no-go zones. ▪ Follow recommendations of an archaeologist if hitherto unknown heritage sites are encountered.
Social Assessment	▪ Influx of construction workers and job seekers. ▪ Direct formal employment opportunities. ▪ Forfeit of development opportunities due to project activities. ▪ Loss of Capital Goods. ▪ Compensation for land acquisition. ▪ Relocation of households. No fatal flaws present	▪ Unskilled job opportunities should be afforded to local residents. ▪ Ensure that local subcontractors receive the necessary support in terms of resources. ▪ Encourage construction workers to use local services. ▪ Route transmission power line far away from homesteads, buildings and irrigation systems. ▪ Make maximum use of undeveloped routings to place towers. ▪ Where possible, stay at least 200m away from residential areas within the urban zone. ▪ Compensate servitude area at

Environmental Parameter Assessed	Potential Impacts	Recommendations/ Mitigation measures
		market rates.
Heritage – KhoiSan issues	Concerns that the KhoiSan Cosmological View, which links the tangible with the intangible aspects of heritage resources, have not been adequately described. Identification of areas affected by "living heritage'. Identification of memorials/sacred spaces of significance such early frontier loan farms , towns and mission stations where KhoiSan were dispossessed first as servants and later as indentured labour. Identification of memorials/sacred spaces of significance such as historic burial sites and burial sites of cultural significance. Frontier Wars-establish and identify the historical landscape where Khoi forces encamped under British military leadership and pushed the Xhosa forces over the Fish River in 1812. Development of statements of significance for these sites based on recognised criteria. Identification, mapping and grading of heritage resources using NHRA criteria.	Targeted Focus Group Meetings with all levels of KhoiSan interest groups, national, provincial and local (Short & Long Term) Additional documentary and archival research regarding the sites in order to Integrated sites of significance and morphological zones in the landscape that are no-go or, red flagged areas (Short term). The development of a social engagement plan that serves as a management framework for the following key activity: (1) capacity and skills development to assist KhoiSan people record their oral history. This would be best achieved in partnership within the Nelson Mandela Bay and Coega Metropolitan Spatial Development Framework and Integrated Policy Development Framework.(Long term)

Cumulative environmental impacts were addressed through the EIA. Cumulative impacts will be likely to occur for most parameters if no mitigation measures are implemented. Many of the cumulative impacts in the parts of the study area relate to the proposed development of numerous energy generation infrastructure projects (especially wind farms); collectively with the

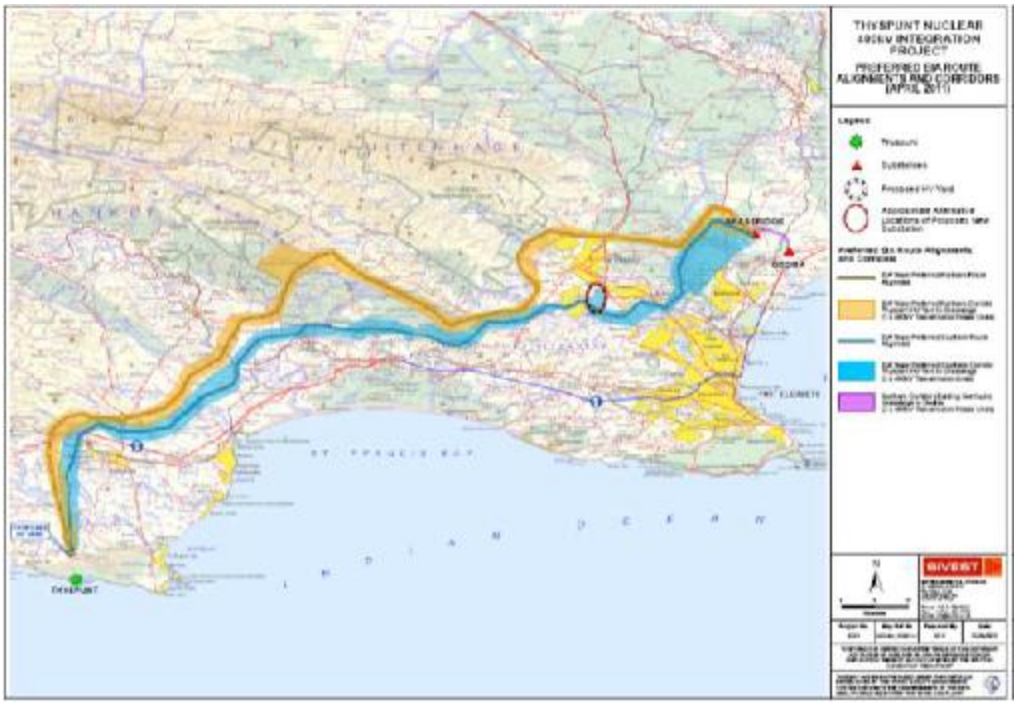
proposed power lines these proposed developments have the potential to exert significant cumulative impacts in particular on the visual, tourism and socio-economic environments.

An extensive and comprehensive public participation process has been undertaken. A number of feedback meetings, key stakeholder workshops, community consultation meetings and landowner open houses, as well as one-on-one consultation have taken place. In addition to providing stakeholder and I&APs with information regarding the proposed project, the main aim of the public participation process has been to inform the EIA Team about feedback on environmental issues and sensitivities received outside parties. The evolution of the routes through the process has been based to a large degree on interested party feedback as described below.

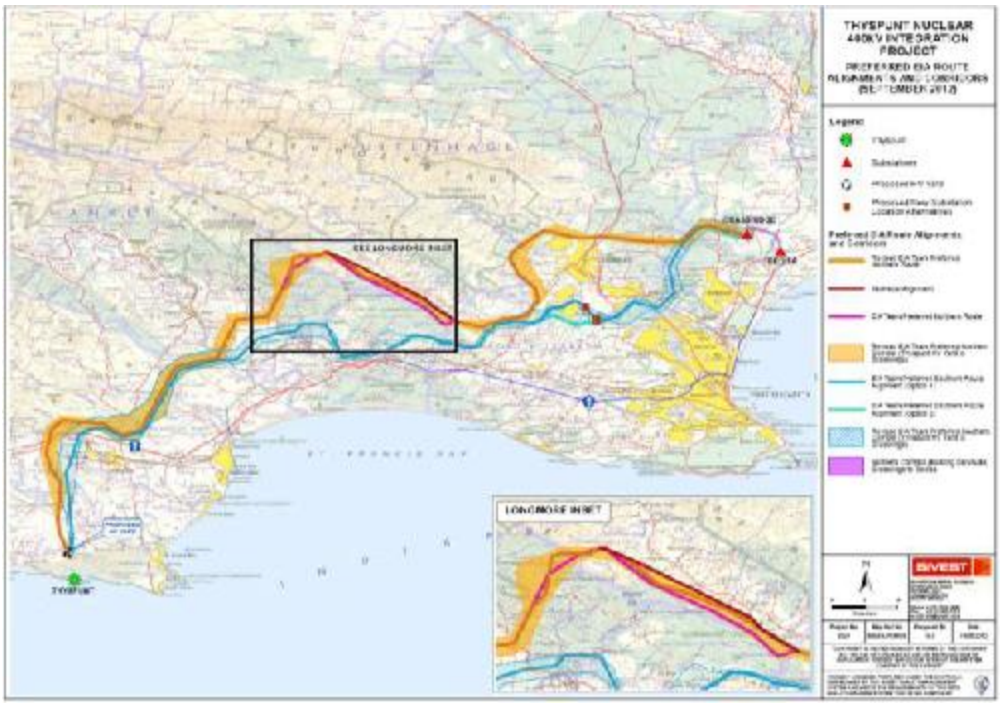
A route change register of the changes to the corridors throughout the EIA has been compiled. Most of these changes have been precipitated by I&AP and stakeholder feedback that identified environmentally sensitive areas that should be avoided. One of the initial changes to the corridors was made on the recommendation of the social and economic specialists. The specialists identified a number of areas of fatal flaws in the Southern Corridor. Parts of the Southern Corridor were shifted up into Alternative 1 of the Northern Corridor, with the Northern Corridor running through Alternative 3 through the Longmore Forest area.

Based on the inputs of individual specialists, as well as feedback from landowners and other stakeholders, an EIA Team-preferred alignment within the corridor was created (refer to map 2 below). In addition, a revised EIA Team-preferred alignment was created following further input and feedback from stakeholders and I&APs (refer to map 3 below). A3 high resolution maps are attached in Appendix 13.

The proposed alignment has taken all relevant spatial environmental sensitivity considerations into account across the spectrum of environmental parameters relevant to this project. The alignment thus avoids a number of identified environmentally-sensitive areas.



Map 2: EIA preferred team alignment presented in the Draft EIR



Map 3: Revised EIA preferred alignment

With the implementation of the mitigation measures detailed within the EMP, the use of the revised EIA Team-preferred alignment for the final routing of the project should allow the proposed development to be constructed and operated without resulting in significant environmental impacts.

It is thus concluded that the proposed development be authorised and allowed to proceed subject to the following recommendations:

- that the mitigation measures as detailed in the report and specified in the EMP be fully implemented during the construction and operational phases of the project.
- that the final alignment be based upon the revised EIA Team-preferred alignment in order to reduce the potential for areas of environmental sensitivity to be impacted.

To expand on the first point the following parameter-specific mitigation measures must be implemented:

- Social issues raised in this report must be attended to;
- Landowners must be constantly kept informed about the project;
- Loss of agricultural land must be kept to the minimum;
- Relocation must only be implemented as a last resort;
- Clearing of indigenous vegetation (especially thicket and fynbos vegetation) under the lines must be kept to a minimum and not undertaken wherever possible;
- Particular care must be taken with the power line construction in mountainous areas of the study area (especially the Longmore area) to avoid the creation of erosion and resultant siltation into rivers (surface water features) in the area;
- Surface water features in the Longmore area must be treated as no go areas due to their sensitivity to impacts and the presence of sensitive and threatened aquatic biota;
- The lines must be kept away from sensitive visual receptors, and that the routing recommendations made in the visual specialist report are adhered to;
- Regular maintenance of the servitude must occur to reduce emergence of alien species and degradation of the environment;
- The undertaking of walk downs of the lines by the following specialists must be conducted prior to the start of construction:
    - Avifaunal
    - Flora and Fauna
    - Wetlands
    - Heritage
- A social investment action plan must be included in the EMP prior to construction commencing.

It is further recommended that the comprehensive Environmental Management Plan (EMP) be implemented which includes the unique mitigation measures identified by the specialist studies.

This will ensure that the power lines are constructed in an environmentally sustainable manner and according to best environmental practice.

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FINAL EIR

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Glossary of Terms

Alien species: Animals and plants invading and becoming established in areas where they do not naturally occur.

Archaeological resources: This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
  wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Alluvial: Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Buffer: A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.

Catchment: The land area from which a river or reservoir is fed, also known as a drainage basin or watershed.

Cultural Significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Development: In an environmental context, "development" refers to the act of altering or modifying resources in order to obtain potential benefits

The "Equator Principles": A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing

Ecosystem: Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space.

Employment: Number of people employed in jobs in the formal sector of the economy.

Environment: NEMA defines "environment" as "the surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any interrelationships among and between them and the physical, chemical aesthetic and cultural properties and conditions that influence human health and well-being".

Environmental Authorisation: It is the written statement from the Competent Authority permitting or refusing the proposed activity. The Authorisation may contain specific conditions which must be complied with. The Applicant must have an Environmental Authorisation granting permission before commencement of a listed activity.

Environmental Impact: The degree of change in an environment resulting from the effect of an activity on the environment, whether desirable or undesirable. Impacts include both the direct or indirect consequences of an activity.

Environmental Impact Assessment: In relation to an application, to which Environmental Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Environmental Impact Report: In-depth assessment of impacts associated with a proposed development. This forms the second phase of an Environmental Impact Assessment and follows on from the Environmental Scoping Report.

Environmental Management Programme: A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.

Ephemeral: When referring to a stream or drainage line, it refers to the flow characteristics by which only periodic surface flows typically occur. Similarly when referring to a pan or depression, this would be characterised by only periods of time when surface water occurs within it, usually associated with the rainy season.

ESRI is a software development and services company providing Geographic Information System (GIS) software and geodatabase management applications.

Erosion: Wearing away of rock and soil by physical or chemical action, especially by wind or water, leading to removal of particles.

Fatal Flaw: an (environmental) fatal flaw is defined as an impact or series of impacts that can be associated with a certain defined area that are of such a magnitude, intensity or significance that it cannot be mitigated to an acceptable level. In this context an environmental fatal flaw would result in a proposed development resulting in an unacceptably high level of impact, if it was not able to be avoided; this could result in an alignment being rejected or stopped.

Fauna: The animal life of a region.

Flora: The plant life of a region.

Geophysics: The study of the physical characteristics and properties of the earth; including geodesy, seismology, meteorology, oceanography, atmospheric electricity, terrestrial magnetism, and tidal phenomena.

Habitat: The normal abode or locality of a living organism defined by the set of physical, chemical and biological features. Considered to be the natural home of species of plants or animals.

Heritage Resources: This means any place or object of cultural significance. See also archaeological resources above

Hydromorphic / Hydric Soil: Soil that in its undrained condition is saturated or flooded long enough during the growing season to develop anaerobic conditions favouring growth and regeneration of hydrophitic vegetation.

Hydrology: The study of the occurrence, distribution and movement of water over, on and under the land surface.

Indigenous: Born, growing, or produced naturally (native) in an area, region, or country.

Integrated Development Plan: A municipal development plan which integrates planning across different government sectors and identifies and sets priorities for development for the short-, medium- and long-term. IDPs are required by all local municipalities in terms of the Local Government Transition Act (No. 97 of 1996).

Kilovolt (kV): a unit of potential equal to a thousand volts (a volt being the standard unit of electric potential. It is defined as the amount of electrical potential between two points on a conductor carrying a current of one ampere while one watt of power is dissipated between the two points).

Land: Terrestrial bio-productive system that comprises soil, vegetation and other biota, as well as the ecological and hydrological processes that operate within the system.

Legal Requirements: Identification and listing of the specific legislation and permit requirements which could potentially be infringed upon by the proposed project.

Listed Activity: Development actions that are likely to result in significant environmental impacts as stipulated in Listing Notice 1, 2 & 3 of the NEMA EIA Regulations.

Lithologies: Mineral composition and classification of rocks.

Load Profile Analysis: Metering and monitoring which provides the information critical to managing energy.

Macro-Geomorphological: Related to / on the scale of geomorphic provinces. A geomorphic province is a spatial entity with common geomorphic attributes.

Monitoring: In an environmental context, the repetitive and continued observation, measurement and evaluation of environmental data to follow changes over a period of time to assess the efficiency of control measures.

Natural Environment: With regard to rivers, aquatic ecosystems and those ecosystems dependent on them.

Negative Impact: A resultant change due to an activity that reduces the quality of the environment (e.g. by reducing indigenous species diversity and the reproductive capacity of the ecosystem; by damaging health; property or by causing nuisance).

Pollution: Defilement or unfavourable alteration of the surroundings, normally as a result of human actions; in the water environment any foreign substance that impairs the usefulness of water.

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

Red Data Species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Rehabilitation: The restoration of a disturbed area which has been degraded as a result of activities such as mining, road construction or waste disposal, to a land use in conformity with the original land use before the activity started.

Riparian: The area of land adjacent to a stream or river that is influence by stream induced or related processes.

Saprolitic: Saprolitic rock is a soft, clay-rich, decomposed rock formed in place by chemical weathering of igneous or metamorphic rock.

Scoping Report: An “issues-based” report which forms the first phase of an Environmental Impact Assessment process

Soil: A mixture of organic and inorganic substances, the composition and structure of the latter is derived from the parent rock material. Soil also contains bacteria, fungi, viruses and micro-arthropods, nematodes and worms.

Topography: Referring to natural features on the surface of the earth.

Tourism comprises the activities of persons travelling to, and staying in places outside their usual environment, for not more than one consecutive year, for leisure, business and other purposes. The usual environment of a person consists of a certain area around his/her place of residence, plus all other places he/she frequently visits.

Tourist (overnight visitor): is a visitor who stays at least one night in collective or private accommodation in the place.

Traveller: refers to any person on a trip between two or more localities (e.g. Countries).

Veld: Southern African term for natural vegetation, usually grassland or wooded grassland, typically containing scattered shrubs or trees.

Visitor: refers to any person travelling to a place other than that of his/her usual environment for less than 12 consecutive months and whose main purpose of trip is not the exercise of an activity remunerated visited. An international tourist is an international visitor who stays at least one night in collective or private accommodation in the country visited. Domestic tourist refers to a domestic visitor who stays at least one night in collective or private accommodation in the place visited.

Watercourse (as defined by the National Water Act): means a river or spring; natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declared to be a watercourse, and a reference to a watercourse includes where relevant, its bed and banks.

Wetland (as defined by the National Water Act): Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

List of Abbreviations

ACO – Archaeology Contracts Office 2010
API – Aerial Photographic Interpretations
BID – Background Information Document
CBD – Central Business District

CDM	- Cacadu District Municipality
CFR	– Cape Floristic Region
DEA	– Department of Environmental Affairs
DMA	- District Management Authority
DME	– The Department of Minerals and Energy
DSR	– Draft Scoping Report
DWA	– Department of Water Affairs
EAP	- Environmental Assessment Practitioner
ECP	-Eastern Cape Province
EIA	– Environmental Impact Assessment
EIR	– Environmental Impact Report
EMF	– Electric and Magnetic fields
EMP	– Environmental Management Plan
ENPAT	– Environmental Potential Atlas
EP	– Equator Principles
ESA	– Early Stone Age
ESRI	– GIS and Mapping software
EWT	– Endangered Wildlife Trust
FGM	– Focus Group Meeting
FSR	– Final Scoping Report
GDP	– Gross Domestic Product
GGP	– Gross Geographic Product
GIS	– Geographic Information System
HIA	– Heritage Impact Assessment
HV	– High Voltage
I&APs	– Interested and Affected Parties
IBA's	– Important Bird Areas
IDP	– Integrated Development Plan
IDZ	– Industrial Development Zone
ICNIRP	– International Commission for Non-Ionising Radiation Protection
ISEP	– Integrated Strategic Electricity Planning
IUCN	– International Union for the Conservation of Nature and Natural Resources
KLM	- Kouga Local Municipality
KSW	– Key Stakeholder Workshop
kV	– Kilo Volt
LM	– Local Municipality
LSA	– Later Stone Age
MBDA	– Mandela Bay Development Agency
MOSS	– Metropolitan Open Space System
MSA	– Middle Stone Age
MSDF	– Metropolitan Spatial Development Framework
MURP	– Motherwell Urban Renewal Programme
NEMA	– National Environmental Management Act, 1998 (Act No. 107 of 1998)

NEMBA	– National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NHRA	– National Heritage Resource Agency
NMBMM	– Nelson Mandela Bay Metropolitan Municipality
NFA	– National Forests Act, 1998 (Act No. 84 of 1998)
NHRA	– National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NSBA	– National Spatial Biodiversity Assessment
NWA	– National Water Act, 1998 (Act No. 36 of 1998)
PM	– Public Meeting
PPP	– Public Participation Process
RDP	- Reconstruction Development Plan
SAHRA	– South African Heritage Resources Agency
SANBI	– South African National Biodiversity Institute
SDF	– Spatial Development Framework
STEP	– Subtropical Thicket Ecosystem Project
TTLIP	– Thyspunt Transmission Lines Integration Project
UHT	– Ultra High Temperature (milk)
VAC	– Visual Absorption Capacity
VT	– Vegetation Type
WHS	– World Heritage Site

ESKOM TRANSMISSION

THYSPUNT TRANSMISSION LINES INTEGRATION PROJECT – NORTHERN CORRIDOR

FINAL EIR

1 INTRODUCTION

1.1 Background

Eskom Holdings Ltd (Eskom) is responsible for the provision of reliable and affordable power to its consumers in South Africa. If Eskom is to meet its mandate and commitment to supply the ever-increasing needs of end-users, it has to plan, establish and expand its generation capacity and associated Transmission power line infrastructure on an on-going basis.

To this end, Eskom has commissioned an Environmental Impact Assessment (EIA) for three proposed nuclear power stations in the greater Cape region. These are proposed to be situated at Duynefontein (near Koeberg), Bantamsklip (near Pearly Beach) and Thyspunt (near Oyster Bay). It must be noted that this is a separate EIA process to the one reported here but has been mentioned to place the requirements of this project in context.

To integrate the electricity that will be generated by the proposed Thyspunt Nuclear Power Station (should a positive Environmental Authorisation be issued by the National Department of Environmental Affairs (DEA)) into the national grid, Eskom Transmission has appointed SiVEST to undertake the EIA for the proposed Thyspunt Transmission Lines Integration Project (TTLIP) which entails the installation of Transmission power lines, the upgrading of existing substations and the proposed construction of the Port Elizabeth (PE) Substation Figure 1 presents the regional context of the study area.

The DEA, formerly DEAT, the National Department of Environmental Affairs is the competent authority on this application. As such, three separate applications for the TTLIP (Northern Corridor, Southern Corridor and the PE Substation) were submitted to DEAT on the 3rd June 2008. These applications were approved on the 11th June 2008. The allocated reference numbers are as follows:

- DEA Ref No: 12/12/20/1211 - Southern Corridor;
- DEA Ref No: 12/12/20/1212 - Northern Corridor; and

- DEA Ref No: 12/12/20/1213 – New Port Elizabeth Substation.

In July 2012, the applications were amended by the project proponent to allow for the split of the Southern Corridor as follows:

- Southern Corridor (Thyspunt HV Yard to Port Elizabeth Substation) - **Retain existing reference number (12/12/20/1211):**
    - 2 x Thyspunt – Port Elizabeth 400kV transmission power lines
- Southern Corridor (Port Elizabeth Substation to Grassridge and Port Elizabeth Substation to Dedisa) and Port Elizabeth Substation - **Retain existing Port Elizabeth Substation reference number (12/12/20/1213)** for the power lines and the substations as listed below:
    - New Port Elizabeth Transmission Substation
    - Upgrade of Grassridge and Dedisa substation
    - 1 x Port Elizabeth – Grassridge 400kV Transmission Power Line
    - 1 x Port Elizabeth – Dedisa 400kV Transmission Power Line

The project proponent split the southern corridor as indicated above in order to allow the Nelson Mandela Bay Metropolitan Municipality (NMBMM) to meet the growing need for power generation in the Municipality as well as to avoid anticipated delays that might be caused by issues pertaining to the Nuclear power station (Nuclear 1) at Thyspunt. It should be noted that the EIA for the Nuclear 1 development is not part of this scope and is being undertaken by Arcus GIBB on behalf of Eskom.

This Environmental Impact Report (EIR) covers the NEMA requirements f**or only the Northern Corridor of the TTLIP** (DEAT Ref No: 12/12/20/1212). The Environmental Impact Report for the Southern Corridor (DEAT Ref No: 12/12/20/1211) and the Southern Corridor (Port Elizabeth Substation to Grassridge and Port Elizabeth Substation to Dedisa) and Port Elizabeth Substation (DEAT Ref No: 12/12/20/1213) for the TTLIP, will be submitted in a separate document.

The Environmental Scoping Report and Plan of Study for EIA for the TTLIP were submitted to DEA, on the 14 August 2009. SiVEST received acceptance of the Environmental Scoping Report and Plan of Study for EIA from DEA on the 28 October 2009. The draft Environmental Impact Report (DEIR) was made available for public review between July and September 2011. During the review period several Public Open Houses took place. The DEIR was submitted and received by the DEA on the 2nd December 2011. Consultation has continued since the submission of the DEIR.

All authority consultation, correspondence and acceptance letters are included within **Appendix 2**.

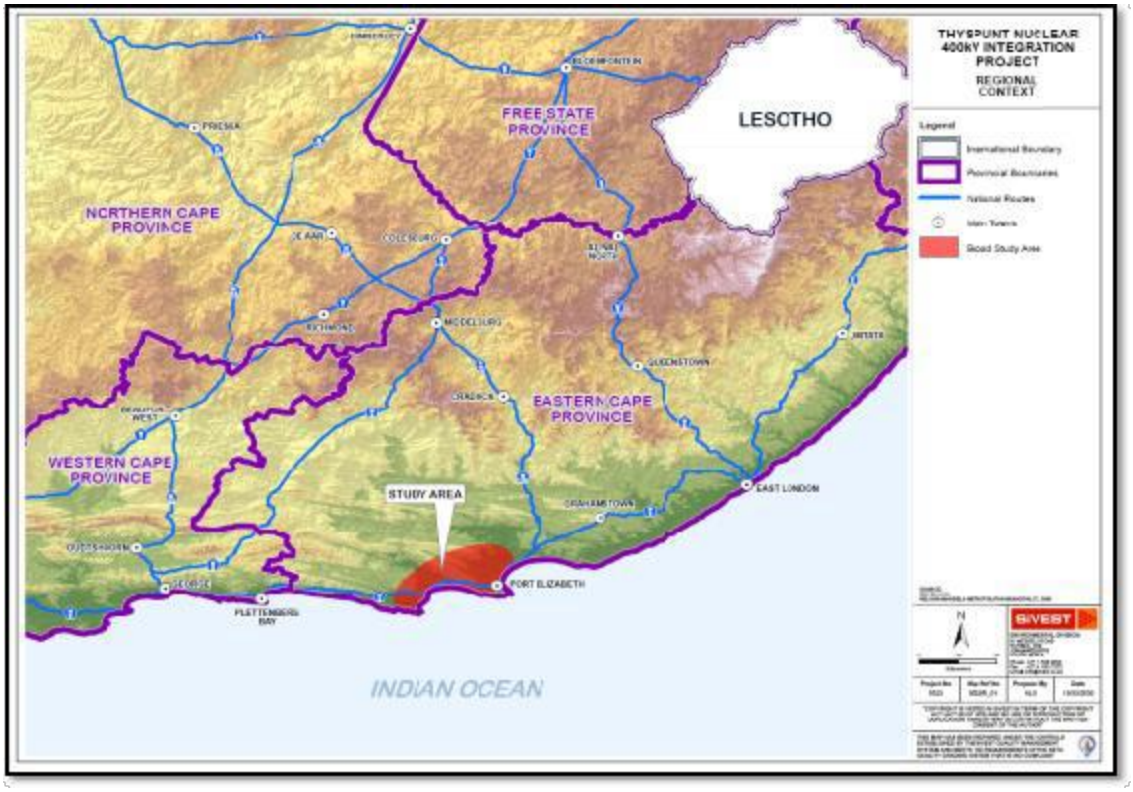


Figure 1: Regional Context Map

1.2 Expertise of Environmental Assessment Practitioner (EAP)

SiVEST has considerable experience in the undertaking of EIAs. Staff and specialists who have worked on this project and contributed to the compilation of this report are detailed in Table 1 below.

Table 1: Environmental and specialist consultants

SKILL	NAME
Project Manager	SiVEST – Paul da Cruz / Kelly Tucker
Report writing and compilation	SiVEST – Faith Kalibbala, Paul da Cruz
Public Participation	SiVEST – Nicolene Venter, Mabel Qinisile
Fauna	SiVEST– Liesl Koch, Faith Kalibbala
Flora	Coastec – Barrie Lowe
	SiVEST– Liesl Koch
Avifauna	Endangered Wildlife Trust – Jon Smallie, Luke Strugnell
Wetlands and Hydrology	SiVEST – Paul da Cruz, Shaun Taylor
Social Impact Assessment	MasterQ Research Pty Ltd – Nonka Byker
Economic Impact Assessment	MasterQ Research Pty Ltd – Raoul de Villiers
GIS and Mapping:	SiVEST – Kerry Schwartz, Andrea Gibb, Lucy Chimoyi
Visual	SiVEST – Paul da Cruz, Kerry Schwartz
Tourism	SiVEST – Faith Kalibbala, Paul da Cruz
Geology	Creo Design – Johan Hattingh and Carlo Fourie
Heritage	Johnny van Schalkwyk
KhoiSan Heritage Assessment	CAS - Mary Patrick
Palaeontological Assessment	University of the Witwatersrand - Bruce Rubidge
Desktop Geotechnical Assessment	Fred A Grove – Geotechnical Engineering
Agricultural Potential	SiVEST – Kurt Barichievy

Please refer to attached CV's for more information (Appendix 1).

1.3 Assumptions and Limitations

- This report is not written in terms of the Equator Principles (EPs) but fully acknowledges that EPs will need to be complied with should certain types of funding for the project be required.
- All information provided by the applicant to the Environmental Team was correct and valid at the time it was provided.
- It is not always possible to involve all Interested and / or Affected Parties individually. However, every effort has / is being made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties.
- The High Voltage Yard associated with the Thyspunt Power Station and the associated power lines from the proposed power station to the HV Yard *are not* part of the scope of this EIA, and have been considered as part of the EIA for the proposed Thyspunt nuclear power station.

2 PROJECT DESCRIPTION

2.1 Proposed Assessment Corridors

The overall project includes two corridors that have been proposed for the TTLIP (Figure 2). Each corridor is unique, the details of which is described below:

- **Proposed Northern Corridor:** 3 x 400kV Transmission power lines
  - 3 x 400kV Transmission power line from Thyspunt past Uitenhage to Eskom's existing Grassridge Transmission Substation
  - 2 x 400kV Transmission power lines from the Grassridge Substation to the Dedisa Transmission Substation

- **Revised Proposed Northern Corridor:** 3 x 400kV Transmission power lines
  - 2 x 400kV Transmission power line from Thyspunt past Uitenhage to Eskom's existing Grassridge Transmission Substation
  - 1 x 400kV Transmission power line from Thyspunt past Uitenhage, past the Eskom's existing Grassridge Transmission Substation to the Dedisa Transmission Substation

- **Proposed Southern Corridor:** 2 x 400kV Transmission power lines
    - 2x 400kV Transmission power lines from Thyspunt to the newly proposed Port Elizabeth Transmission Substation
    - 2x 400kV Transmission power lines from the newly proposed Port Elizabeth Transmission Substation to Eskom's existing Grassridge Transmission Substation

- **Proposed new Port Elizabeth Transmission Substation location**
    - Three proposed (study) sites for the new PE Substation are proposed; in the Fitches Corner Area, in the area between Despatch and KwaNobuhle and an area south east of KwaNobuhle.
    - The minimum size (footprint) of the proposed Port Elizabeth Transmission Substation site is 320m x 230m, which needs to accommodate:
        i. Four (4) 400kV Transmission power lines exiting the proposed substation
        ii. Three (3) 400/132kV transformer bays; and
        iii. Eight (8) 132kV feeder bays.

- **Revised Proposed Southern Corridor (Thyspunt HV Yard to Port Elizabeth Substation)**
    - 2 x Thyspunt – Port Elizabeth 400kV transmission power lines
- **Revised Proposed Southern Corridor (Port Elizabeth Substation to Grassridge and Port Elizabeth Substation to Dedisa) and new Port Elizabeth Substation:**
    - New Port Elizabeth Transmission Substation
    - Upgrade of Grassridge and Dedisa substation
    - 1 x 400kV transmission power lines from Port Elizabeth – Grassridge
    - 1 x 400kV transmission power lines from Port Elizabeth Port Elizabeth – Dedisa

- **Proposed upgrade of Eskom's existing Grassridge and Dedisa Transmission Substations**
    - These upgrades include the associated infrastructure required to integrate the proposed new substation into Eskom's Electricity Transmission grid (including the construction of service/access roads, the construction of extra lighting towers at the substation sites, etc).
    - Additional feeder bays to accommodate additional lines.

The map below shows the location of the corridors ***at the start of the EIA phase*** (refer to section 6.4 below for route changes).

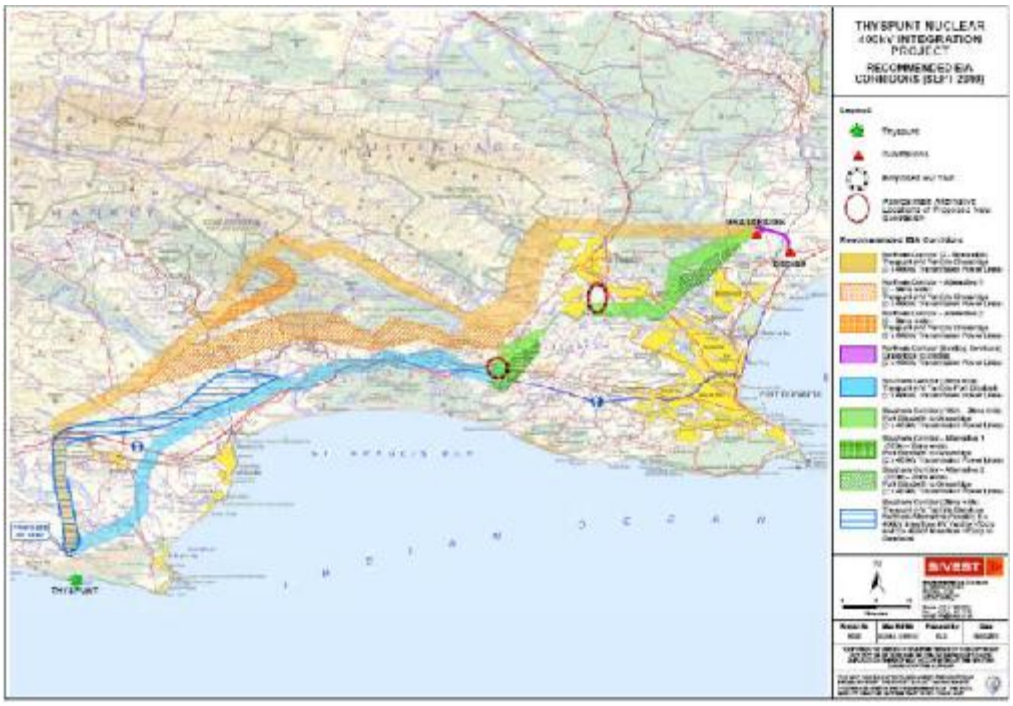


Figure 2: Locality Map- Northern and Southern Corridors and PE Substation at the start of the EIR phase ~~(Sept 2010)~~

Important information pertinent to the corridors:

It is important to note that these corridors (Northern and Southern) are not alternatives to each other, as both are anticipated to be utilised by Eskom to carry a total of 5 X 400kV lines from the proposed nuclear power station. Eskom has identified the need to keep the proposed lines in two seperate corridors as a risk aversion factor. Two separate and independently operated transmission line corridors are proposed in order to guarantee the electricity supply from the proposed Thyspunt Nuclear Power Station should the transmission lines in one of the corridors become non-operational, the electricity supply from the proposed power station would be guaranteed.

At the start of the EIR phase:

In terms of location alternatives assessment, the corridors provide adequate space for a number of potential alternative alignments to be located within them. In a section of the Northern Corridor three distinct alternatives were presented for assessment in the EIA phase. Similalry in three sections along the Southern Corridor alternatives were presented for assessment.

The EIA corridors were narrowed from the scoping phase corridors (which were typically ~5km in width) to an approximate 2km width. There are certain points along the corridors where the corridors have been narrowed futher to avoid sensitive areas.

The study area (as indicated in Figure 2 above) indicates the boundary for the identification of stakeholders and for specialists to undertake their environmental studies for this proposed TTLIP.

Changing of Corridors through the EIR phase

As described in more detail in section 6.4 below, the corridors have undergone significant changes through the full EIA process, and within the EIR phase in response to various environmental issues that have been identified / raised by stakeholders and I&APs. The corridors at the time of writing of the Draft EIR are presented in Figure 3 below. Most of the specialist studies for the EIR-phase were undertaken based on the corridors presented for assessment at the start of the EIR-phase. However its important to note that the Draft EIR and the revised draft EIR have taken cogniscance of the EIA team preferred corridors as well as the revised EIA team preferred route, in terms of each environmental parameter assessed.

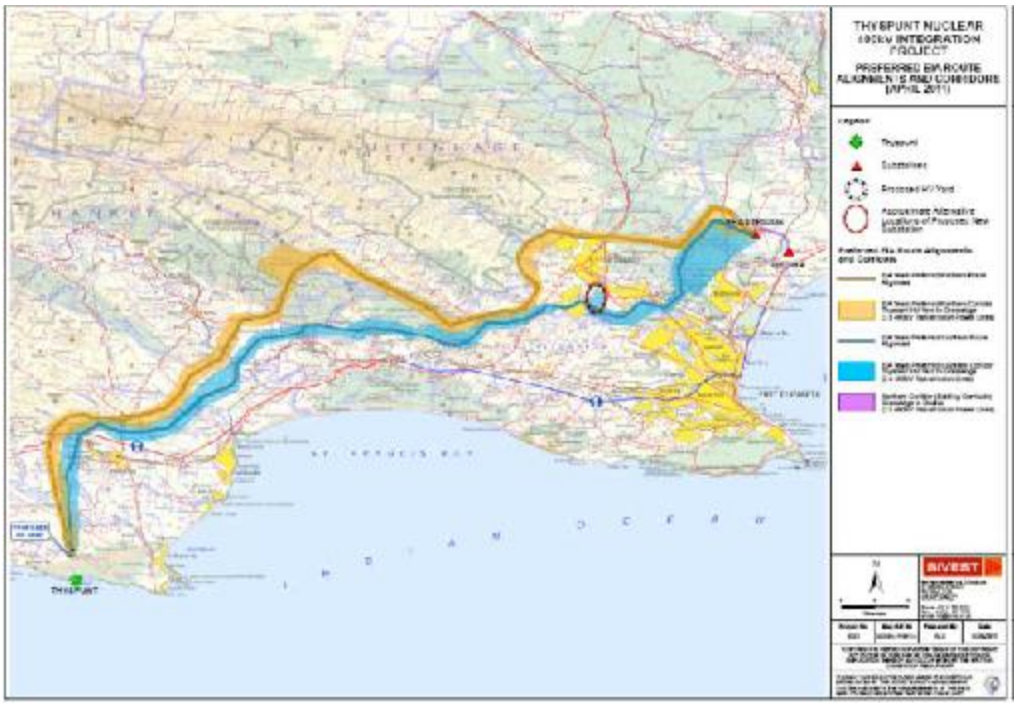


Figure 3: EIA Team-preferred alignments in DEIR issued in July 2011 (Detailed map is provided in Appendix 13)

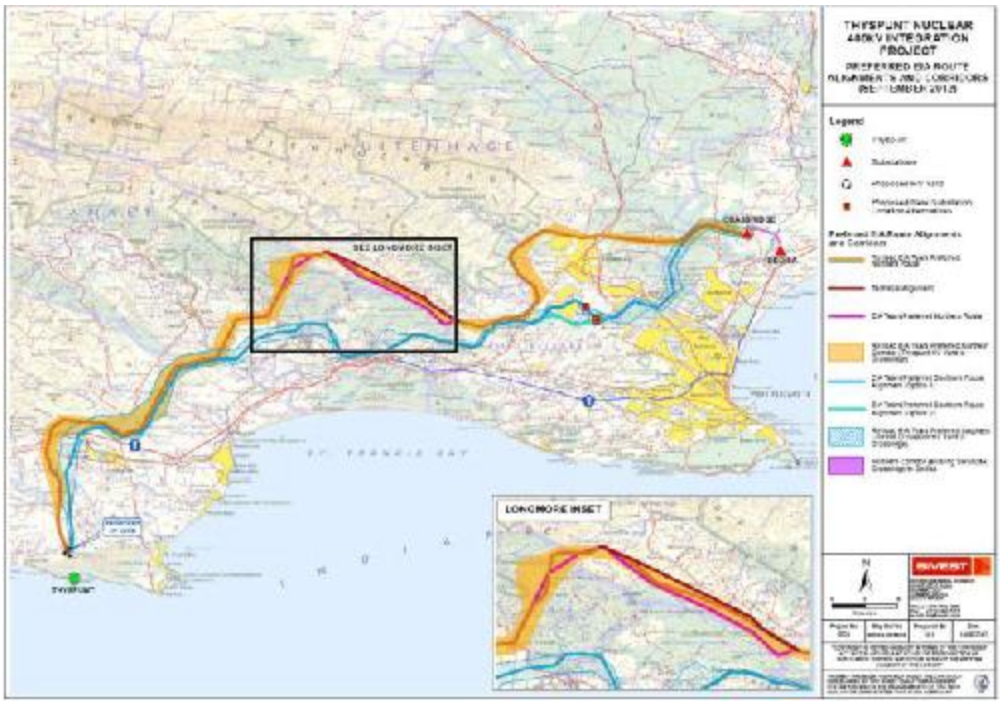


Figure 4: Revised EIA Team-preferred route (Detailed map is provided in Appendix 13)

2.2 Power Line Servitudes and Tower Types

- In terms of Eskom standards, a single 400kV line will require a servitude of 55m in width.
- Assuming the Northern Corridor has 3 Transmission lines in it – the servitude will be a total of 165m wide.
- Assuming the Southern Corridor has 2 Transmission lines in it – the servitude will be a total of 110m wide.
- In most cases the land beneath the overhead lines can be used, as normal, by the landowners. Eskom, however, require that no dwellings or vegetation/crops higher than 4m be established within the servitude.
- Currently it is proposed (but not finalised) that the Cross Rope Suspension-type tower will be used (Figure 6). This tower is approximately 40m in height. The total footprint area required for each tower is 70m x 30m (including the tower supports). A diagram of the proposed tower and other potential tower types is indicated below.
- Self Support tower types will be used as strain towers (a strain tower is a larger tower utilised in bends and where reinforcement is required with regards to tower stability).

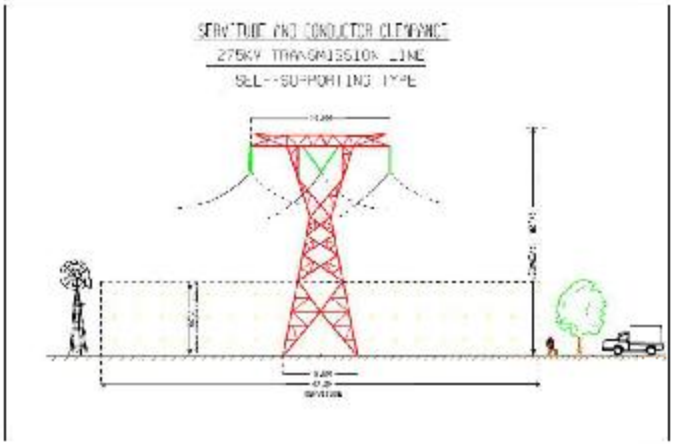


Figure 5: The Self-Supporting (Strain) Tower type

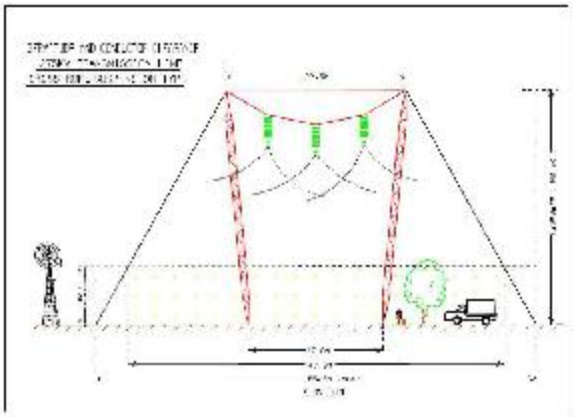


Figure 6: The Cross Rope Suspension Tower Type

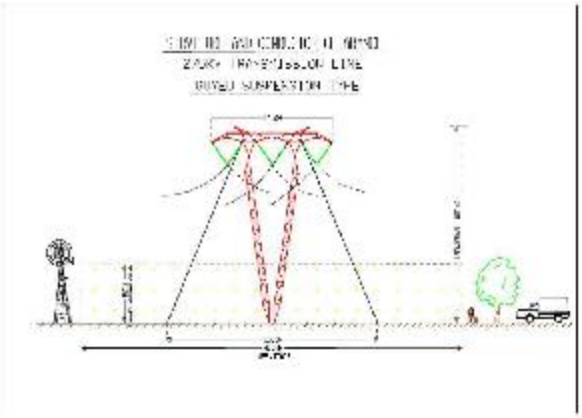


Figure 7: The Guyed Suspension Tower

Figure 8: Difference between cross rope suspension towers (left photo) and self support towers (left in right photo) and a guyed suspension tower (right in right photo)

2.3 Substation Upgrading Components and Details

As part of this project, both the Dedisa and Grassridge Substations are proposed to be upgraded. The details of the proposed upgrading are provided below.

2.3.1 Dedisa Substation

At the Dedisa Substation the 400kV busbar system at needs to be extended and the feeder 3 needs to be fully equipped to deal with the new lines. Thus a fully equipped 400 kV feeder bay with double busbar selection and bypass capability needs to be constructed. Essentially this upgrading will entail the construction of new metal structures within the substation. The fence surrounding the substation will need to be extended and new operational lighting will need to be erected; lighting masts 24 m high will need to be erected. No new roads will be required to be built as part of the upgrading.

2.3.2 Grassridge Substation

At Grassridge, similar new provisions for the lines need to be made. The set up is slightly different to Dedisa, and at Grassridge bringing in the fourth feeder will require that the busbar be sectionalised further to create a fourth zone. The busbar system will further have to be extended by two bays. No new fencing, extra roads or additional lighting will be required to be installed at the substation.

2.4 Route Descriptions

The route descriptions for both the corridors at the start of the EIR phase (refer to Figure 2) as well as for the EIA Team-preferred alignment for the Northern Corridor are presented below.

2.4.1 Route Descriptions for the Northern Corridor at the start of the EIR phase

The Northern Corridor exits the High Voltage (HV) yard associated with the proposed Thyspunt Power Station to the north of the transverse dunes and moves in a northerly direction towards Humansdorp. The corridor crosses the unsurfaced road between Oyster Bay and Humansdorp in the vicinity of the Farm Kleinrivier. The corridor crosses the steeply incised Krom River Valley at the Farm Elandsjagt (downstream of the Impofu Dam) and then crosses the Geelhoutboom River at the Farm Platjesdrift. The corridor crosses R102 and then the Seekoei River and in the vicinity of the farm Geelhoutboom and a small portion of the farm Platjesdrift to the west of Humansdorp. The corridor continues in a northerly direction further traversing the farm Geelhoutboom and across N2 and some hilly terrain to the north of the highway on the farm Pampoensland Rivier. At the farm Pampoensland Rivier, the Corridor turns in a north-easterly direction crossing R332 and some hilly ground at the farm Honeyville. From this section (around Honeyville farm) up to the area around Rocklands, there are three alternatives within the Northern Corridor:

- Alternative 1 – This alternative splits from Alternative 3 in the area of farms Weltevreden and Zuurbron. Alternative 1 traverses the R330 Provincial Road on the farm Weltevreden. It continues through the farm Zuurbron where it crosses the upper reaches of the Kabeljous River. The route alternative then traverses the Gamtoos River Valley in the vicinity of the farms Rooidraai, Bosch Bok Hoek and Spitsbak Estate. It continues in an easterly direction through hilly incised terrain on farms Buffels Hoek and Loerie River where it crosses the R331 Provincial Road. The alternative then traverses the area around Loerie Dam and the Loerie Dam Nature Reserve to the north of the town of Loerie, crossing the farms Loerie River, Geelhoutboom and Jagersfontein. Most of this portion of the route runs to the south of the boundary of Otterford State Forest and the Longmore State Forest, traversing the Longmore Forest offices, housing and saw mill (the Longmore Forest Station). To the east the alternative crosses the farms Platberg, Klaarefontein and before entering the Longmore State Forest to the north of the Van Stadens River Mountains. The corridor traverses forestry land (plantations) through this section, crossing the Van Stadens River. The alternative exits the

Longmore area to the north of Van Stadensberg Natural Heritage Site Nature Reserve through the farm Boschfontein where it reconnects to Northern Corridor - Thyspunt (HV Yard) to Grassridge alternative 3 (described below).

- Alternative 2 - *(Please note – Alternative 2 is a deviation off Alternative 3).* This alternative splits from Alternative 3 south-east of the town of Hankey. The route alternative continues in a north-easterly direction traversing the R331 on the farm Roodefontein and continuing through very hilly, natural terrain on the forms Limebank and Klein Rivier, running parallel with the valley of the Klein River. In the vicinity of the Otterford and Forest Reserve (to the west of the old Otterford Forest Station), the route curves towards the northwest through a very steeply incised area. It continues north-westwards through plantations until it re-joins Alternative 3.

- Alternative 3 – this alternative splits from Alternative 1 in the vicinity of the R332 Provincial Road and the Diep River at the farms Honeyville, Weltevreden and Zuurbron. To the east of this point the alternative runs roughly parallel to the R330 provincial road down the Hankey Pass into the Gamtoos River Valley. The alternative crosses the Gamtoos Valley to the south of the hamlet of Weston, traversing the farms Rooidraai, Gamtous Riviers and Wagendrift. The alternative passes to the east of Hankey, continuing in a north-easterly direction traversing the R331 Provincial Road. The alternative crosses hilly, incised terrain crossing the Klein River valley on the farms Klein Rivier and Kleinfontein. The alternative continues across very hilly, incised terrain across a portion of the Stinkhoutberg Nature Reserve, entering the Otterford Forest as the route curves to the south-east through a very steep area within Otterford State Forest, crossing the Hankey Forest reserve and the farm Sand River Heights. The alternative crosses the Sand River upstream of the Sand River Dam through forestry land. The alternative continues in a south-easterly direction, following the southern side of the Elands River valley across the farms Palmiet River and Peneheale, and running parallel to the Elands River Road. The alternative enters the Longmore State Forest, crossing the Bulk River Dam and running through the farm Uplands before linking up with Alternative 1 in the vicinity of the farm Boschfontein.

From the point at which Alternative 1 and 3 join, the corridor runs in a north-easterly direction, crossing the farms Boschfontein, Brakkefontein, Ruigteveli and Burghley Hills through an un-inhabited hilly area to the north of Rocklands. The corridor heads north-eastwards along the eastern boundary of Groendal Wilderness Area, traversing the Elands River valley through the Wincanton Estate, Kruisrivier and Mimosadale West. The Corridor then crosses the Swartkops River in the Kruisrivier area west of Uitenhage, crossing a number of small farms in the valley. The corridor then climbs into uninhabited land to the west and north of Rosedale, turning to the east. The Corridor traverses uninhabited farm land to the north of Uitenhage, crossing a minor road as well as the R75 Provincial Road, running between Levydale and the Springs Nature Reserve and Resort. To the east of the R75, the corridor then crosses farming land on the farms Sandfontein, Gras Rug, Longwood, Rietheuwel and Papenkuils Vley. The corridor crosses the farm Welbedachsfontein, crossing the R335 provincial road before feeding into the Grassridge Substation.

East of the Grassridge Substation the Northern Corridor (existing Servitude) Grassridge to Dedisa runs eastwards across largely natural thicket vegetation on the farm Brak River, then south-eastwards and finally southwards until it terminates at the Dedisa Substation which is located to the north of the R334 and R102.

It is important to note that the alternatives mentioned above were assessed at the start of the EIR phase. An EIA team preferred route was selected based on the above alternatives. The EIA team preferred alignment has been further revised based on feedback from I&APs and stakeholders during the DEIR review period and is referred to as the 'revised EIA team preferred alignment'. The EIA team preferred and the revised EIA team preferred alignments are described below.

2.4.2 Route Description for the EIA Team-preferred alignment

The route alignment exits the High Voltage (HV) yard associated with the proposed Thyspunt Power Station to the north of the transverse dunes and moves in a northerly direction towards Humansdorp. The alignment crosses the unsurfaced road between Oyster Bay and Humansdorp in the vicinity of the Farm Kleinrivier. The alignment crosses the steeply incised Krom River Valley at the Farm Elandsjagt to the east of the Impofu Dam and then crosses the Geelhoutboom River in the vicinity of the Farm Meyersrus and a small portion of the Farm Platjesdrift. The alignment crosses R102 and then N2within the farm Geelhoutboom to the west of Kruisfontein, Humansdorp. The alignment continues in a north easterly to the east of the Narrow Gauge then traverses some hilly terrain and the Seekoei River to the north of the highway (N2) on the Farm Pampoensland Rivier. In the Vicinity of the Farm Pampoensland Rivier, north of the N2 highway, the alignment turns in an easterly direction. It then crosses gently sloping areas within the farm Kruisfontein A and the Rondebos River at the Farm Zwartebosch. The alignment traverses R332 and R330 at the Farm Zwartebosch

In the vicinity of the Farms Misgund, Weltevreden and Zuurbrons Koof to the south and southeast of Kabeljous River, the alignment turns in a north-easterly direction. It continues in a north easterly direction crossing an unidentified gravel road (that links the R102 to the R330 and R332) as well as a number of drainage systems within the Farm Zuurbrons Koof. It then traverses the Gamtoos River at the Farm Zuurbrons Koof as well as a canal in the Farm Bosch Bok Hoek to the north of the Gamtoos River. The alignment crosses R330 within the Farms Roodefontein and Kleinfontein. It continues along R330 in a north-easterly direction within the Farm Kleinfontein and then runs through Otterford Forest and crosses Klein River southeast of Stinkhoutberg Nature Reserve. The alignment then runs through very hilly terrain in the Otterford Forest near the Otterford Forest Station located towards the Farm Sand River Heights outside the boundaries of Otterford Forest.

In a very steep area at the Farm Sand River Heights, outside forestry land to the south of Sand River Dam, the alignment turns in a south-easterly direction following the southern side of the Elands River valley. It crosses a section of the Sand River at the Farm Palmiet River. The alignment enters Longmore Forest and continues along the boundaries of the Forest (behind the highest southern ridge of the Elands River valley). It crosses the Bulk River Dam in the Farm Bulk River and then runs through the Farm Uplands and Watershed.

In the vicinity of the Farm Watershed, north-east of the Van Stadens River, the alignment turns north-eastwards. It continues in a north-easterly direction through the Farm Boschfontein, then the farm Burghley Hills and Mimosadale West to the west of Holrivier and the township of KwaNobuhle. It continues north-eastwards adjacent to the Brickworks and then curves north-westwards in an area east of Elands River. The alignment continues north-westwards through the Farm Kruis Rivier and then curves north-eastwards at the Farm Springfield west of the town of Uitenhage. It then crosses the Swartkops River in the Kruisrivier area to the west of Uitenhage, crossing a number of small farms. The alignment then climbs into uninhabited land to the west and north of Rosedale and Kamehs and then turns to the east. It traverses a hilly uninhabited area north of Rosedale and Kamehs in the Farm Doornkom. The alignment then crosses a minor road as well as the R75 Provincial Road. To the east of the R75, the alignment then crosses farming land on the farms Sandfontein, Sandfontein Annex, Gras Rug, Longwood, Rietheuwel and Alwijn Balmoral. In the area of the farm Alwijn Balmoral, the alignment turns north-eastwards and crosses more farming land on farms namely Papenkuils Vley and Grassridge. In the vicinity of the Farm Grassridge, the alignment curves south-eastwards crossing the provincial road R335 and the Farm Welbedachsfontein before feeding into the Grassridge Substation

2.4.3 Descriptions for the Revised EIA Team Preferred Alignment

The narrow route exits the High Voltage (HV) yard associated with the proposed Thyspunt Power Station to the north of the transverse dunes and moves in a northerly direction towards Humansdorp. The route crosses the unsurfaced road between Oyster Bay and Humansdorp in the vicinity of the Farm Klein Rivier. The route crosses the steeply incised Krom River Valley at the Farm Elandsjagt to the east of the Impofu Dam (where it widens) and then crosses the Geelhoutboom River in the vicinity of the Farm Elandsjagt and the Farm Platjesdrift. The route crosses R102 and then N2 within the farm Geelhoutboom to the west of Kruisfontein, Humansdorp. It then turns eastwards and continues in that direction in an area east of the Narrow Gauge. The route traverses some hilly terrain and the Seekoei River to the north of the highway (N2) on the Farm Pampoensland Rivier. The route continues eastwards crossing the farm Zwartebosch, R330 and R332.

In the vicinity of the farms Zwartebosch and Melkoutbosch, the route bends north-eastwards, crossing Kabeljous Rivers within in the farm Weltevreden and the other farm lands such as Zuurbronskloof and Zuur Bron. At the Farm Zuur Bron, the route turns eastwards. It continues in an easterly direction traversing more farming land and the Gamtoos River. The route crosses a canal within the vicinity of the Farm Remainder of the farm Bosch Bok Hoek where it bends in a north-easterly direction and continues in that direction through the Roodefontein and then crosses R330 within the Kleinfontein. Within the farm Kleinfontein, the route bends eastwards and continues in that direction along R330. It then turns north- eastwards near Taaiboschlaagte and runs through Otterford Forest and crosses Klein River southeast of Stinkhoutberg Nature Reserve. The route then runs through very hilly terrain in the Otterford Forest near the Otterford Forest Station located towards the Farm Sand River Heights outside the boundaries of Otterford Forest.

In a very steep area at the Farm Sand River Heights, outside forestry land to the south of Sand River Dam, the route turns in a south-easterly direction following the southern side of the Elands River

valley. It crosses a section of the Sand River at the Farm Palmiet River. The route enters Longmore Forest and continues along the boundaries of the Forest. It crosses the Bulk River Dam in the Farm Bulk River and then runs through the Farm Uplands.

In the vicinity of the Farm Boschfontein, north-west of Rocklands, the route turns north-eastwards. It continues in a north-easterly direction through the Farm Boschfontein, Brakkefontein and then the farm Burghley Hills. In the area west of the township of KwaNobuhle and east of Elandsriver, the route turns northwest. It continues north-westwards traversing Elandsriver near Plumbago Hills. The route then curves north-eastwards and then crosses the Swartkops River in the Kruisrivier area to the west of Uitenhage, crossing a number of small farms. The route then climbs into uninhabited land to the west and north of Rosedale and Kamehs and then turns to the east. It traverses a hilly uninhabited area north of Rosedale and Kamehs in the Farm Doornkom. The route then crosses a minor road as well as the R75 Provincial Road. To the east of the R75, the route then crosses farming land on the farms Sandfontein, Sandfontein Annex, Gras Rug, Longwood, Rietheuwel and Alwijn Balmoral. In the area of the farm Alwijn Balmoral, the route turns north-eastwards and crosses more farming land on farms namely Papenkuils Vley, Welbedachtsfontein and Grassridge. In the vicinity of the Farm Grassridge and Welbedachtsfontein (before crossing R335), the route curves south-eastwards, then crosses the provincial road R335 and the Farm portion 3 of the farm Grassridge and farm Gelukdal. It then feeds into the Grassridge Substation.

3 PROJECT NEED AND DESIRABILITY

3.1 Project Need

Electricity provision in South Africa is a critical issue. It is impossible to create an economically sound country without a secure and reliable energy source. In addition, with the threat of climate change and global warming, the pressure to generate green energy (as an alternative to coal-fired energy, South Africa's primary energy source and the most damaging to the environment in terms of emissions) is becoming increasingly real. Thus it is Eskom's intent to diversify the energy provision options with one option being the increase in the number of Nuclear Power Plants. With this in mind, Eskom conducted a feasibility study for the construction of new conventional nuclear power plants in the greater Cape region, with potential sites at Duynefontein, Thyspunt and Bantamsklip identified, the primary purposes being power supply generation and network expansion.

Should the proposed nuclear power plant at Thyspunt be granted authorisation and be developed, the new power plant will need to be linked into Eskom's national electricity transmission grid. The closest part of the transmission grid is located to the north of Coega (north-east of Port Elizabeth). Eskom thus identified the need for transmission lines to be constructed between the proposed Thyspunt power station and the grid, at the existing Grassridge Substation. The proposed power lines and associated existing substation upgrades (at Grassridge and Dedisa) would thus form an important and necessary component of the electricity infrastructure related to the proposed power station; the power station would not be able to be operated without a link into the grid.

Further to the need to link the proposed Thyspunt power station into the grid, the Nelson Mandela Bay Metropolitan Municipality (NMBMM) has identified potential future shortfalls in electricity, with projected demand for electricity projected to outstrip supply in the future. The need for a new transmission substation to supply the Metro with more electricity has thus been identified – the proposed Port Elizabeth (PE) Substation. The linking of the lines from Thyspunt to the substation would allow the power generated at Thyspunt to be supplied to the NMBMM to meet future electricity supply requirements. Even if the proposed Thyspunt Substation did not proceed and thus the lines between Thyspunt and Grassridge were not developed, lines linking Grassridge and Dedisa with the proposed PE Substation (within the Southern Corridor) as well as the Substation would need to be built to supply NMBMM with the required power.

In an overall national electricity supply context, the proposed power lines would be required and would be necessary should the Thyspunt Nuclear power station be developed. In a more local context the need for extra electricity supply to the NMBMM requires the development of a new transmission substation within the Metro and lines to link this new substation into the national grid.

3.2 Project Desirability

The electricity that would be transmitted by the proposed power lines would bring benefits to a wide area at a regional, or even national, scale. The proposed power lines would allow the electricity generated at the proposed Thyspunt nuclear power station (should this be authorised and developed) to be transmitted into other parts of the Eastern Cape and South Africa via the transmission grid. The extra electricity generation capacity associated with the power station that would be transmitted via the proposed lines would be a significant factor in improving the current electricity supply crisis situation in the country. As the power station cannot operate without the associated power lines, the lines are critical to ensuring that this generation capacity is able to be transmitted into the existing grid.

The lines would also allow a growing need for power generation in the NMBMM to be met, via the proposed PE Substation that would allow additional distribution power lines to be constructed to supply electricity to the end users. This extra power provision to the Port Elizabeth area would help the Metro meet its electricity and energy objective of providing electricity to all households as well as facilitate the growth of new industry and other development in the Metro. One of the key development nodes in the NMBMM and in the wider Eastern Cape Province is the Coega IDZ; distribution via 400kV Transmission lines from the proposed Thyspunt Nuclear Power Station would provide optimal integration into the IDZ load centre, from a technical and economic perspective. Most of the power generated by the new proposed power station would be consumed in the Eastern Cape, and the transmission lines would thus assist in much needed development in this province. It is in this context that the proposed power lines are desirable, by assisting Eskom and indirectly the NMBMM and other municipalities in the Eastern Cape to meet the needs of electricity supply in a regional and national context.

In the same context of project desirability, opposition to the presence of five new high voltage power lines within parts of the study area has been raised by a number of stakeholders and I&APs, especially within certain parts of the study area that are natural in character and have a relatively low density of human habitation and related human infrastructure. In this context many stakeholders and I&APs have expressed the view that the proposed power lines would be undesirable. As specified in the section below on the approach to the study, the corridors have been altered on a number of occasions, and large parts of both the Northern and Southern Corridors have been discarded due to significant environmental sensitivities and potential impacts. Through the development of the EIA Team-preferred alignment in the DEIR, the proposed power lines were shifted into parts of the study area that were identified as least environmentally sensitive. In this way the desirability of the proposed development was shown to have been improved in this context by being associated with fewer impacts.

A number of Interested and Affected Parties (I&APs) and stakeholders have expressed the undesirability of the proposed power lines as they relate to the proposed nuclear power station at Thyspunt. The length of the lines and the size of the area traversed, in linking the proposed power station with the grid at Grassridge, has been seen to be an undesirable factor associated with the project. In this context a comment / question has been raised by a number of parties as to why the

proposed power station cannot be located closer to the national grid; e.g. in the Coega area where the Coega IDZ is located. It is not part of the scope of this EIA to comment on the desirability of the proposed nuclear power station development, the process undertaken by Eskom to select its location at Thyspunt, or whether it is environmentally suitable for it to be potentially located at Thyspunt (the EIA for the Nuclear 1 development undertaken by Arcus GIBB on behalf of Eskom Transmission should be consulted for this information). The proponent (Eskom) did however provide a response to the query on why the proposed power station cannot be located at Coega within the Scoping Phase of the project. As explained above the shifting of the power lines away from environmentally sensitive areas, in particular the coastal belt should serve to lessen the undesirability associated with the proposed power lines as raised by a number of I&APs.

The proposed PE Substation preferred location is in a currently vacant area situated in between a number of densely populated urban areas. The PE Substation site after assessment has not been associated with any environmental sensitivity, and the wider area has been earmarked to be developed for municipal housing. In this context the location of a transmission substation is desirable as it will be unlikely to clash with the surrounding current (and future) land uses.

4 ALTERNATIVES ASSESSMENT FOR THE NORTHERN CORRIDOR

The EIA Regulations under NEMA require that alternatives be assessed. A number of different types of alternatives have been considered as part of this EIA. In addition to location (routing) alternatives technology and the "no-go" alternative have been assessed.

4.1 Location and Alignment Alternatives

As mentioned previously, the two proposed corridors are not alternatives of each other. Two types of routing alternatives for the proposed power lines in the Northern Corridor are possible. Firstly due to the presentation of a corridor (generally ~2km in width) multiple alignments for the three power lines within this corridor are possible. As such the final alignment of the power lines to avoid environmentally-sensitive areas has been possible. The presence of a corridor as a study area for the proposed power lines has allowed the EIA Team-preferred alignment to be created and to subsequently altered and refined based on stakeholder feedback.

Secondly, a number of alternatives within certain parts of the Northern Corridors were identified at the start of the EIR phase. These alternatives were presented in the Longmore Forest Area of the Northern Corridor study area, and were created to align with the Longmore Forest firebreaks as recommended by the forestry operator in the area, MTO. These alternatives are presented in Table 2 below.

Table 2: Routing Alternatives assessed for the proposed Northern Corridor at the start of the EIR phase.

Alternative	Location
Northern Corridor Alternative 1 (Longmore Forest Southern Firebreak Alternative)	This alternative starts at the split with Alternative 3 (south of Hankey) running eastwards past the Loerie Dam Nature Reserve and then running on the southern boundary of the Longmore State Forest. It ends at the join with Alternative 3 to the north-west of Rocklands
Northern Corridor Alternative 2 (Stinkhoutberg Alternative)	This alternative is a diversion off Alternative 3 to avoid traversing the Stinkhoutberg Nature Reserve. The alternative splits from Alternative 3 to the east of the town of Hankey, crossing the Loerie Ruskamp property and running into the Otterford State Forest. It turns north-west running parallel to the boundary of the Stinkhoutberg Nature Reserve to re-join Alternative 3
Northern Corridor Alternative 3 (Longmore	This alternative starts at the split with

Alternative	Location
Northern Firebreak Alternative)	Alternative 1 (south of Hankey) running north-eastwards across the Gamtoos Valley near the town. It runs across the Stinkhoutberg Nature Reserve and into the Otterford (Longmore) Forest. To the west of the Sand River Dam It turns south-east to follow the southern side of the Elands River valley running parallel to the Elands Valley Road (and along the Longmore Forest Northern Firebreak) to where it intersects Alternative 1 north-west of Rocklands.

Each of these alternatives were comparatively assessed by each specialist study. These comparative assessments and the result of these have been presented in Section 11 below.

Two alternative study areas for the proposed PE Substation were identified for specialist assessment. Section 11 below provides the results of this comparative assessment and the substation study area that has been preferred from an environmental perspective.

As mentioned above, the alternatives in this section were assessed at the start of the EIR phase only. Furthermore, the location of the PE substation has been revised following receipt of feedback from Stakeholders. Details pertaining to the PE substation are presented in the Southern Corridor Final EIR.

4.2 Technology Alternatives

In addition to the routing alternatives, various technology alternatives were considered.

4.2.1 Structural alternatives

Two tower design alternatives were considered for this proposed project namely; the cross rope suspension-type and the guide rope suspension-type towers. In addition the self support tower will need to be utilised as a strain tower in areas of more difficult terrain or where the route bends. As mentioned above, the cross rope suspension tower-type is proposed for this project.

4.2.2 Belowground alternatives

Laying the lines under the sea bed or underground were considered as alternatives to the overhead lines, however both options were disqualified as they are technically and economically unfeasible. The cost of laying the lines underground or under the sea bed would be approximately ten-times

higher than the overhead lines. The system would also be less reliable as the restoration time will take longer in the event of a fault. In addition an extra Transmission line would be required which will further increase the costs.

4.2.3 Capacity alternatives

The option of using fewer 765kV lines as an alternative to the 400kV lines was taken into account, however in terms of the forecasted developments in the Coega IDZ; most of the power generated by the new power station would be consumed in Eastern Cape. Therefore, 400kV transmission lines will provide optimal integration into the IDZ load centre, from a technical and economic perspective.

4.3 The "No-go" Alternative

The "no-go" alternative assumes that the proposed activity does not go-ahead, implying a continuation of the current situation or the status quo. The "no-go" or "no-action" alternative is regarded as a type of alternative that provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the "no-go" alternative it is important to take into account the implications of foregoing the benefits of the proposed project.

In the case of this project, the "no-go" alternative would entail that no transmission power lines would be constructed to allow electricity to be transmitted out of the power station. . The absence of transmission power lines to link the nuclear power station with the national grid would not allow the power station to provide any electricity to the grid, thus not allowing the power station to assist in the improvement of the electricity supply situation in the country. In this case, none of the negative or positive impacts associated the proposed power lines would be likely to occur. Accordingly a number of negative impacts would be unlikely to materialise, but this should be weighed up against the non-materialisation of the positive impacts associated with the project and in particular the benefits to the national economy that would be associated with the provision of electricity from the proposed power station. The selection of the no-go option would also hinder the future supply of electricity to the Port Elizabeth area, as discussed below.

It should be noted that should the proposed nuclear power station at Thyspunt not be approved or developed, then there would be no need for power lines to link the Thyspunt area with the national grid. Accordingly the Northern Corridor lines would not be required, and the lines between the Port Elizabeth Substation and Thyspunt would not be developed. Under this scenario, the Port Elizabeth Substation and the Grassridge Substation would be developed, as increased electricity supply needs to the Metro have been identified as discussed elsewhere in this report. The lines between the Grassridge Substation and the proposed Port Elizabeth Substation would allow increased power to be supplied to the Metro from the grid at Grassridge. Should these lines and the Port Elizabeth Substation not be developed as part of the "no-go" option, the Municipality would be significantly constrained in its ability to provide more electricity for future development and electrification needs in the Metro, thus potentially having significant retarding impacts in terms of not allowing future development and service provision.

5 LEGAL AND ADMINISTRATIVE REQUIREMENTS

In terms of the EIA Regulations (GN R385, GN R386, GN R387 of 21 April 2006, as amended) published under the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), the proposed Northern Corridor transmission lines, together with associated structures and infrastructure, comprise a number of listed activities under GN R386 and GN R387 of 21 April 2006 (as amended). It is thus required that an EIA be undertaken for purposes of seeking to obtain an environmental authorisation to undertake the listed activities.

5.1.1 The general duty of care in terms of section 28 of NEMA

Section 28(1) of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) stipulates that "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".

Eskom therefore has a responsibility to ensure that the undertaking of the proposed activities conforms to this general duty of care in terms of section 28 of NEMA. The proponent is accordingly obliged to take the appropriate reasonable measures to prevent, minimise or rectify pollution or degradation of the environment in terms of section 28 of NEMA.

5.1.2 NEMA EIA Requirements

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an environmental authorisation, the result being that NEMA now governs the EIA process with the promulgation of the EIA Regulations in April 2006. The EIA Regulations are contained in three Government Notices (GN R385, GN R386, GN R387 of 21 April 2006, as amended) and generally came into force on 3 July 2006.

Apart from other matters regulating the EIA process and related matters, GN R385 lays out two distinct authorisation processes. Depending on the nature of the listed activity that is proposed to be undertaken, either a so-called "basic assessment" process or a so-called "scoping and EIA" process is required to apply for an environmental authorisation in terms of NEMA. GN R386 lists the activities that trigger the requirement for the basic assessment process to be followed, while GN R387 lists the activities that require scoping and a full EIA. If an application is for two or more listed activities as part of the same development, and scoping and EIA must be applied in respect of any of the activities, then scoping and EIA must be applied to the application.

Government Notice (GN) No. R 387: Listing Notice 2 stipulates that an Environmental Impact Assessment is required for:

- **Activity 1(l):** The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more.

It should be noted that this activity encompasses the proposed construction and operation of the proposed power lines as well the substation upgrades

- **Activity 2:** Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more.

The following activities under GN R 386, Listing Notice 1 are also relevant

- **Activity 1(m):** The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32m from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs.

It should be noted that this activity *may be* incurred, should towers need to be placed within a water resource such as a wetland. This would also apply to the construction of any new roads / accesses through these features.

- **Activity 7:** The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.

It should be noted that this activity *may be* incurred, and relates specifically to the storage of dangerous goods, such as fuel, in a storage area such as a construction camp to be used for construction. This activity may also apply to the proposed upgrading of the Grassridge and Dedisa Substations.

- **Activity 12:** The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

It should be noted that this activity *may be* incurred if vegetation clearing of a sufficient size occurs. The requisite endangered vegetation types that may be impacted upon are listed in the biodiversity section below.

- **Activity 15:** The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.

It should be noted that roads / accesses *may be required* to be constructed to allow construction and operational access to the line. As the route is unable to be finalised until after the EIA is completed, it is not possible to provide detail of where roads would be required to be constructed, if at all.

- **Activity 20:** The transformation of an area zoned for use as public open space or for a conservation purpose to another use.

In terms of GN R385, Eskom is required to appoint an independent environmental consultant (an Environmental Assessment Practitioner – EAP) to undertake the required environmental processes, in this case, scoping followed by EIA. The scoping phase has been completed and the project is now in the EIA phase.

5.1.3 National Heritage Resources Act, 1999 (Act 25 of 1999)

The protection and management of South Africa's heritage resources is primarily regulated by the National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA). The law ensures community participation in the protection of national heritage resources and involves all three levels of government (national, provincial and local) in the management of the country's national heritage. The South African Heritage Resources Agency (SAHRA) is the enforcing authority for the NHRA.

In terms of the Act, various forms of heritage resources (such as graves, certain trees, archaeological artefacts, fossil beds, etc.) are afforded protection and a permit may be required to destroy, damage, excavate, alter, etc. protected heritage resources).

In this regard, cognisance should also be taken of the Eastern Cape Heritage Resources Act 2003 (Act 9 of 2003).

Furthermore, in terms of section 38 of the NHRA, the responsible heritage resources authority can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed. The activities identified in section 38 of the NHRA that apply to this proposed nuclear integration include:

- Section 38 (1) (a): The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- Section 38 (1) (c): any development or other activity which will change the character of a site
    i. exceeding 5 000 m^2 in extent; or
    ii. involving three or more existing erven or subdivisions thereof; or
    iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; and
- Section 38 (1) (d): The rezoning of a site exceeding 10 000 m^2 in extent.

However, the provisions of section 38 do not apply to a development as described if an evaluation of the impact of such development on heritage resources is required in terms of (among other legislation), NEMA. This is subject to the proviso that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of section 38(3) and that any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.

5.1.4 National Water Act 1998 (Act 36 of 1998)

The National Water Act 1998 (Act 36 of 1998) (NWA) provides a framework to protect the water resources of South Africa.

In the context of the proposed project and any potential impact on water resources there are two aspects of the NWA which are of key importance. The first is the mechanism for authorising various water uses (as detailed in section 21 of the NWA). If any water uses are to be undertaken as part of the project they will need to be authorised in accordance with one of the mechanisms created under the NWA, which include Schedule 1 water uses, generally authorised water uses and licensing of water uses.

In terms of section 19 of the NWA, "An owner of land, a person in control of land or a person who occupies or uses the land on which any activity or process is or was performed or undertaken; or any other situation exists, which causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring".

These measures may include (inter alia):

- Measures to cease, modify, or control any act or process causing the pollution;
- Compliance with any prescribed waste standard or management practice;
- Containment or prevention of the movement of pollutants;
- Remediation of the effects of the pollution; and
- Remediation of the effects of any disturbance to the bed and banks of a watercourse.

This Act is relevant to the proposed project as the construction of the transmission lines and the substation may impact negatively on water resources (for example, streams, rivers, wetlands and

underground water resources). Eskom is therefore required to take all reasonable measures to prevent pollution to water resources as a result of the proposed project.

5.1.5 Protected species – Provincial Legislation

There is protection afforded to certain animal and plant species within the various provinces of the country. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation. The Nature and Environmental Conservation Ordinance, 1974 (Ordinance 19 of 1974) is the ordinance of relevance in the Eastern Cape.

5.1.6 National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) operates in conjunction with the National Environmental Management: Protected Areas Act No. 57 of 2003. Both Acts emerge from the recommendations of the White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity (1998) and were originally conceived of as one Act.

The overarching aim of the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA), within the framework of NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources
- to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;
- to provide for co-operative governance in biodiversity management and conservation; and to provide for a South African National Biodiversity Institute (SANBI) to assist in achieving the objectives of the Act.

The South African National Biodiversity Institute (SANBI) was established by the NEMBA, its purpose being (*inter alia*) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

NEMBA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a "restricted activity" involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established.

It is also appropriate to undertake a Faunal and Botanical Impact Assessment where developments in an area that is considered ecologically sensitive require an environmental authorisation in terms of NEMA, with such Assessment taking place during the basic assessment or EIA. These two studies will be undertaken during the Eskom project.

The NEMBA is relevant to the proposed project as the construction of the transmission lines and the substation may impact negatively on biodiversity. Eskom is therefore required to take appropriate reasonable measures to limit the impacts on biodiversity, to obtain permits if required and to also invite SANBI to provide commentary on any documentation resulting from the proposed nuclear integration.

5.1.7 National Forests Act, 1998 (Act 84 of 1998)

The main purpose of the National Forests Act No 84 of 1998 as amended is to promote the sustainable management and development of forests for the benefit of all. Amongst the other functions of the Act, the purpose most relevant to a project such is this is the provision of special measures for the protection of certain forests and trees. The Act ensures that protected trees are preserved. A list of protected trees was published in GN 734 of the 16th September 2011. Any trees included on this list that are affected by any development require a permit to be removed or affected in any way.

Should any protected trees be affected on the site by the development they would require a permit in terms of this Act.

5.2 Equator Principles (EPs)

The Equator Principles are a financial industry benchmark for determining, assessing and managing social & environmental risk in project financing. A number of banks, exchanges and organisations worldwide have adopted the Principles as requirements to be undertaken to acquire funding. Furthermore, certain funding institutions have not formally adopted the Principles, but require clients to be compliant with them in order to qualify for loans.

Equator Principles Funding Institutions (EPFIs) use a system of social and environmental categorisation, based on the International Finance Corporation's (IFC's) environmental and social screening criteria, to reflect the magnitude of impacts understood as a result of assessment. This is done as part of their (EPFIs) review of a project's expected social and environmental impacts.

These categories include:

- Category A: Projects with potential significant adverse social or environmental impacts that are diverse, irreversible or unprecedented;

- Category B: Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures;

- Category C: Projects with minimal or no social or environmental impacts.

The Equator Principles are summarised below:

Principle 1: Review and Categorisation
When a project is proposed for financing, the Equator Principles Funding Institution ("EPFI") will categorise the project based on the magnitude of its potential impacts and risks.

Principle 2: Social and Environmental Assessment
For each project assessed as being either Category A or Category B, the client / borrower must conduct a Social and Environmental Assessment ("Assessment") process to address the relevant impacts and risks of the proposed project. The Assessment should also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project.

Principle 3: Applicable Social and Environmental Standards
The Assessment will refer to the applicable IFC Performance Standards and applicable Industry Specific EHS Guidelines.

Principle 4: Action Plan and Management System
The client / borrower must prepare an Action Plan ("AP") or management system that addresses the relevant findings, and draws on the conclusions of the Assessment. The AP will describe and prioritise the actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks identified in the Assessment. The management measures are required to comply with applicable host country, social and environmental laws and regulations, and requirements of the applicable Performance Standards and EHS Guidelines, as defined in the AP.

Principle 5: Consultation and Disclosure
The client / borrower or third party expert must consult with project affected communities in a structured and culturally appropriate manner. For projects with significant adverse impacts on affected communities, the process will ensure their free, prior and informed consultation and facilitate their informed participation as a means to establish, to the satisfaction of the EPFI, whether a project has adequately incorporated affected communities' concerns.
In order to accomplish this, the non-technical summaries must be made available to the public by the borrower for a reasonable minimum period in the relevant local language and in a culturally appropriate manner.

Principle 6: Grievance Mechanism
To ensure that consultation, disclosure and community engagement continues throughout construction and operation of the project, the borrower must, scaled to the risks and adverse impacts

of the project; establish a grievance mechanism as part of the management system. This will allow the borrower to receive and facilitate resolutions of concerns and grievances about the project's social and environmental performance raised by individuals or groups from among project-affected communities.

Principle 7: Independent Review

For all Category A projects and, as appropriate, for Category B projects, an independent social or environmental expert not directly associated with the borrower must review the Assessment, AP and consultation process documentations in order to assist the EPFIs due diligence, and assess Equator Principles compliance.

Principle 8: Covenants

An important strength of the Principles is the incorporation of covenants linked to compliance. For Category A and B projects, the client / borrower will covenant in financing documentation:

- To comply with all relevant host country, social and environmental laws, regulations and permits in all material respects
- To comply with the AP (where applicable) during the construction and operation of the project in all material respects
- To provide periodic reports in a format agreed with EPFIs (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third party experts, that is;
    i. document compliance with the AP (where applicable), and
    ii. provide representation of compliance with relevant local, state and host country social and environmental laws, regulations and permits
- To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan

Principle 9: Independent Monitoring and Reporting

To ensure ongoing monitoring and reporting over the life of the loan, EPFIs will, for all Category A projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower to retain qualified and experienced external experts to verify its monitoring information, which would be shared with EPFIs.

Principle 10: EPFI Reporting

Each EPFI adopting the Equator Principles commits to report publicly at least annually about its Equator Principles implementation processes and experience, taking into account appropriate confidentiality considerations.

Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that EPs will need to be complied with should funding for the project be required. In general, the following documentation will need to be considered in that regard:

- The "Equator Principles" 2006
- International Finance Corporations Performance Standards on Social and Environment, IFC, April, 2006 namely:
    - Performance Standard 1: Social and Environmental Assessment and Management Systems
    - Performance Standard 2: Labour and Working Conditions
    - Performance Standard 3: Pollution Prevention and Abatement
    - Performance Standard 4: Community Health, Safety and Security
    - Performance Standard 5: Land Acquisition and Involuntary Resettlement
    - Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
    - Performance Standard 7: Indigenous Peoples
    - Performance Standard 8: Cultural Heritage

- International Finance Corporation – World Bank Guidelines, General EHS Guidelines 2007.

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). These EHS Guidelines are applied as required by the World Bank's respective policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors.

- The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs.

5.3 Key Development Strategies And Guidelines

5.3.1 Introduction

The proposed nuclear integration Transmission lines extend through three municipalities, namely:

- Cacadu District Municipality (one of six district municipalities in the Eastern Cape and in which nine local municipalities are located, including Kouga);
- Nelson Mandela Bay Metropolitan Municipality (the only metropolitan municipality in the Eastern Cape and incorporating Port Elizabeth and Uitenhage);
- Kouga Local Municipality (incorporating Jeffrey's Bay, Humansdorp and St Francis Bay); and
- District Management Area (located north of Kouga).

5.3.2 Integrated Development Plans

An Integrated Development Plan (IDP) is defined in the Local Government: Municipal Systems Act, 2000 (Act 32 of 2000), as an inclusive and strategic plan that:

- Links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality;
- Aligns the resources and capacity of the municipality with the implementation of the plan
- Forms the policy framework on which annual budgets must be based; and,
- Is compatible with national and provincial development plans and planning requirements binding on the municipality in terms of legislation.

The main purpose of the IDP is considered the enhancement of service delivery and fighting poverty through an integrated and aligned approach between different role-players and stakeholders.

Each municipality is required to produce an IDP and each addresses pertinent issues relevant to their municipality. However, common concerns include municipal transformation and development, and service delivery and infrastructural development. With regards to the latter, electricity, amongst other municipal services, is highlighted as an issued warranting attention, in particular the provision of electricity to all dwellings and, specifically, the goal of the municipality to provide the necessary infrastructure to support investment and future growth.

Thus the proposed nuclear power station and the subsequent integration of that power in to the Eastern Cape electrical grid are aligned with the goals of the municipal IDPs in the study area.

5.3.3 Spatial Development Framework

A Spatial Development Framework (SDF) is a plan which outlines the desired spatial development of a municipality. It highlights priority investment and development areas and serves as a guide to decision-makers and investors. A SDF is an integral component of the corresponding IDP, its purpose being to translate the IDP into its spatial implications to provide broad, overall development guidelines. The aim of a SDF is not to control spatial development but rather to act as a framework that gives strategic guidance in respect of the location and nature of anticipated future development in a given municipality. Because land is a scarce resource, it needs to be planned in the most optimum manner.

Again, because the proposed nuclear integration transmission lines extend through three municipalities (Nelson Mandela Bay Metropolitan Municipality, Cacadu District Municipality and Kouga Local Municipality), three SDFs are applicable to the study area contemplated in this report.

Again the three SDFs have similar aims. The demand for social housing, and therefore land, is high in all three municipalities. Of course, any restructuring and/or expansion of any urban area require that municipal services are available, including electricity. All three municipalities, particularly the Mandela

Bay Metropolitan Municipality, have planned for extensive expansion in both the housing and industrial sectors, which necessitates the provision of electricity.

5.3.4 Integrated Energy Plan for the Republic of South Africa, 2003

The Integrated Energy Plan, developed by the DME (Now under the jurisdiction of the Department of Energy – DoE), was formulated to address the energy demand of the country balanced with energy supply, transformation, economics and environmental considerations in concourse with available resources. One of the main objectives of the plan is to promote universal access to clean and affordable energy, with emphasis on household energy supply being co-ordinated with provincial and local integrated development programmes. Another objective is to ensure that environmental considerations in energy supply, transformation and end use are made. This project is thus a goal in order to implement this plan.

5.3.5 Integrated Strategic Electricity Planning (ISEP), 2005

Eskom's Integrated Strategic Electricity Planning (ISEP) process is intended to provide strategic projections of supply-side and demand-side options to be implemented to meet long-term load forecasts. It provides the framework for Eskom to investigate a wide range of new supply-side and demand-side technologies with a view to optimising investments and returns.

5.3.6 Nelson Mandela Bay Metropolitan Integrated Development Plan 2007 - 2011

Like the rest of South Africa, the Nelson Mandela Bay Metropolitan Municipality (NMBMM) endured the electricity outages that plagued the country and the Mandela Bay Metropolitan IDP thus highlights electricity provision as a key service delivery and infrastructure issue in terms of deliverables and key performance outcomes. Currently 98% of households in the municipal demarcated residential areas have access to electricity. However, the Municipality is aware of the challenge of ensuring access to electricity by all and this includes people currently residing in informal areas. The IDP also mentions the potential use of alternative sources of energy.

The provision of nuclear energy and the integration of this energy into the provincial grid are considered to be line with the requirements of the NMBMM IDP.

5.3.7 Kouga Municipality Integrated Development Plan 2007 - 2012

It is the goal of the Kouga Local Municipality that all formal households have access to reliable and affordable electricity as well as streetlights, which supports safety and access for emergency services, by 2012. To this end, Kouga Local Municipality envisions the upgrading of bulk electrical supply as well as distribution systems. Thus the provision of nuclear energy and the integration of this energy

into the provincial grid are considered to be in line with the requirements of the Kouga Municipality IDP.

5.3.8 Nelson Mandela Bay Metropolitan Draft Spatial Development Framework

The Nelson Mandela Bay Metropolitan Draft SDF provides guidelines to the further expansion and densification of the urban areas in its jurisdiction. The main core areas are Port Elizabeth, Uitenhage, Despatch and Coega Industrial Development Zone (IDZ). These areas are experiencing significant growth in terms of the need for bulk services, which includes electricity. To continue providing service to existing areas and to provide for the future, bulk services need to grow as well. The NMBMM Draft SDF highlights both the sustainable use of existing services but also aware that further capacity is required to match current and future growth.

The provision of nuclear energy and the integration of this energy into the provincial grid are considered to be in line with the requirements of the NMBMM Draft SDF.

5.3.9 World Heritage Convention Act, 1999 (Act 49 of 1999)

The World Heritage Convention Act 49 of 1999 provides for:

- The Incorporation of the World Heritage Convention into South African law;
- The enforcement and implementation of the of the World Heritage Convention in South Africa;
- The recognition and establishment of World Heritage Sites;
- The establishment of Authorities and the granting of additional powers to existing organs of state;
- The powers and duties of such Authorities, especially those safeguarding the integrity of World Heritage Sites;
- Where appropriate, the establishment of Boards and Executive Staff Components of the Authorities;
- Integrated management plans over World Heritage Sites;
- Land Matters in relation to World Heritage Sites;
- Financial, auditing and reporting controls over the Authorities; and
- Incidental matters.

The main objective of the Act is to make the World Heritage Convention part of South African Law, by giving effect to the values of the Convention. It aims to provide for sustainable development within World Heritage Sites; promoting associated tourism development, encouraging investment and job creation and ensuring that active measures are taken protect and conserve the cultural and natural heritage of South Africa.

Chapter IV of the Act requires that the Authority established to manage a world heritage site must prepare and implement an integrated development management plan and ensure that all activities are conducted in accordance with such plan. The integrated development management plan must sets out a framework for development in the park, allowable activities and terms and conditions for conducting such activities.

The Act is relevant to this proposed project as portions of the Stinkhoutberg Nature Reserve and Groendal Nature Reserve are within the proposed transmission line corridor and plans are in place to extend the World Heritage Site (WHS) status to these reserves as part of the Cape Floral Region WHS. If these areas receive world heritage status the corridor will need to be managed in accordance with the integrated management plan established for this area as well as any measures developed by the Authority to protect the WHS.

6 APPROACH TO UNDERTAKING THE STUDY

The Environmental Impact Assessment was undertaken in accordance with the Environmental Impact Assessment Regulations (2006) published in GN No. 385, No 386 and No 387 in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended as well as with the relevant legislation and guidelines mentioned above.

6.1 Environmental Scoping Study

The Scoping Study identified the potential positive and negative impacts associated with the proposed development. The Scoping Study also identified the studies which were required to be undertaken as part of the EIR-phase of the project. The Draft Scoping Report was made available for public review from Wednesday 6th May 2009 to Tuesday 30 June 3 2009. There were numerous comments on the Draft Scoping Report raised by I&APs as well as authorities. Raised comments were included in the issues and Response Report (I&RR) as part of the Final Scoping Report that was submitted to the determining authority.

The Final Scoping Report and Plan of Study for EIA for the TTLIP were submitted to DEA, on the 14 August 2009. SiVEST received acceptance of the Final Scoping Report and Plan of Study for EIA from DEA on the 28 October 2009. All authority consultation, correspondence and acceptance letters are included within **Appendix 2**.

The following studies have been taken through into the EIA Phase:

- Avifaunal Assessment
- Surface Water Assessment
- Flora Assessment
- Fauna Assessment
- Visual Impact Assessment
- Social Impact Assessment
- Tourism Assessment
- Heritage Assessment
- Geology and geohydrology Assessment
- Agricultural Potential Assessment
- KhoiSan Heritage Assessment
- Desktop Geotechnical Assessment

6.2 Authority Consultation

The National Department of Environmental Affairs (DEA) is the determining authority on this application. The following consultation took place with DEA:

- An application for the Northern Corridor (Thyspunt-Port Elizabeth) was submitted to DEA on the 5th June 2009.
- The applications was assigned a reference number on 11 June 2008 i.e. 12/12/20/1212 and. Permission was thus granted to submit a Scoping Report for the proposed project.
- The Final Scoping Report was submitted to the National Department of Environmental Affairs (DEA) on the 14th of August 2009 and approved on the 28th October 2009. The acceptance of the Final Scoping Report from DEA stated that comments from the Department's of Biodiversity and Conservation Directorate had not yet been received and that they would be forwarded to SiVEST as soon as the DEA had received them. These comments have, to date, not been received from the DEA.
- The Draft Environmental Impact Report was submitted to DEA on the 2nd December 2011. Receipt of the DEIR was acknowledged on 14th December 2011.
- Furthermore, consultation with the public continued after the DEIR was submitted to DEA. In order to address various issues raised during the public review period and after the DEIR was submitted to DEA, the EAP and Eskom held several meetings with various Stakeholders. As such a progress letter was submitted to DEA on 14 August confirming that the project is still active. The progress letter was acknowledged on 28th August 2012.

A record of all authority consultation is included within **Appendix 2**.

Consultation with other relevant authorities was undertaken via meetings and telephonic consultation in order to actively engage them and provide them with information and gain their feedback. Authorities and key stakeholders consulted include the following:

- Department of Water Affairs (DWA)
- Department of Land Affairs
- Eastern Cape Parks
- Eastern Cape Tourism Board
- South African Heritage Resources Agency (SAHRA)
- Nelson Mandela Bay Metropolitan Municipality (NMBMM)
- Cacadu District Municipality
- Local Ward Councillors
- South African National Roads Agency Limited (SANRAL)
- Department of Agriculture, Forestry and Fisheries (DAFF)
- Surrounding and affected land owners
- Tribal authority
- Department of Public Works
- Department of Mineral Resources (DMR)
- Department of Energy (DoE)

- Air Traffic and Navigation Services (ATNS)

6.3 Environmental Impact Report

The EIR Phase of the project has focused on consulting with Interested and / or Affected Parties as well as conducting specialist studies to address the potential impacts identified during the Scoping Phase.

The purpose of the EIR is to:

- address issues that have been raised during the scoping phase;
- assess alternatives to the proposed activity in a comparative manner;
- assess all identified impacts and determine the significance of each impact; and
- formulate mitigation measures to be implemented to minimise the significance of negative impacts identified.

6.4 Route Change Register

A critical component of the undertaking to the TTLIP EIA from the start of the process to the current date has been the refinement of the study area corridors based on feedback from stakeholders and I&APs and to take into account environmental issues identified. The proposed corridors have undergone a number of changes as detailed in the route change register section that follows. This section has been compiled to demonstrate how environmental constraints have been taken into account through the EIA process and translated into route changes. In addition a potential alignment for the respective sets of lines within the corridors has been compiled – the 'EIA Team-preferred alignments'. This was done to meet the requests of a number of I&APs who requested that a proposed alignment within the corridors be indicated. This alignment was presented to potentially-affected landowners and Key Stakeholders for comment and was changed throughout the EIA process based on their comments.

The route change register details these changes to the corridors from the start of the scoping phase. A3 high definition maps with better resolution are included in Appendix 13.

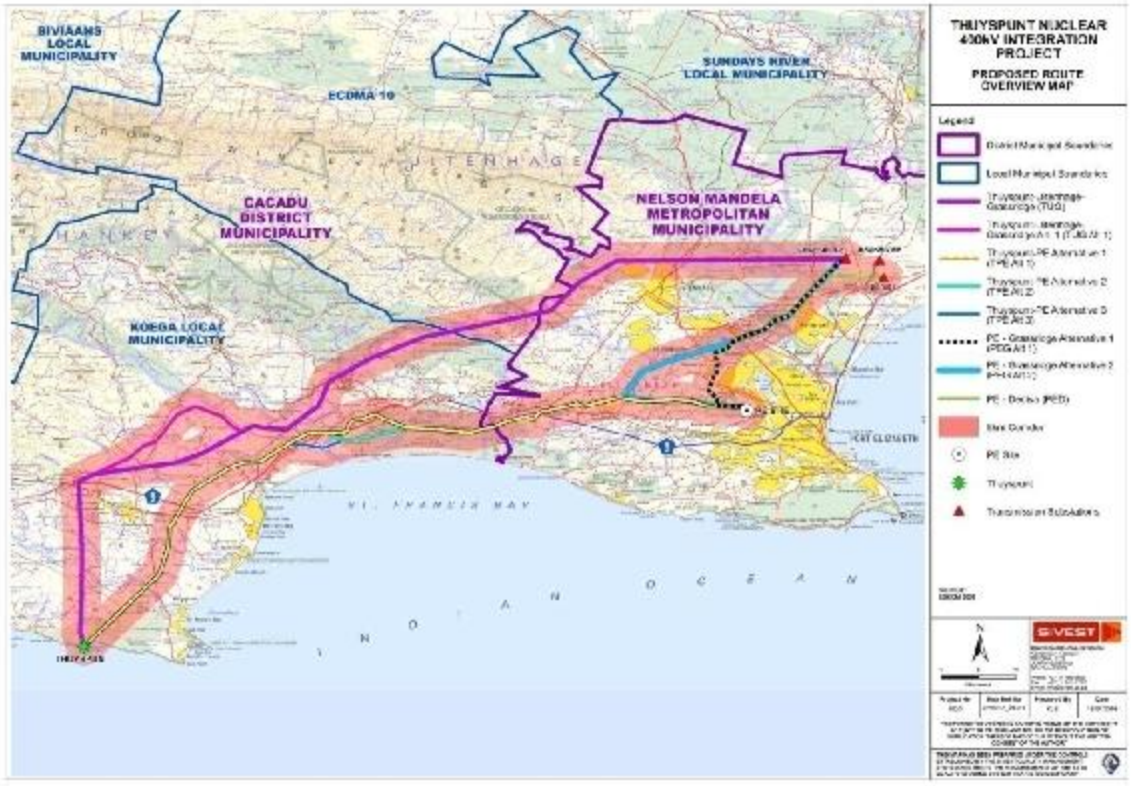


Figure 9: Date: July 2008 **(Original Scoping Routes):** Original route alignment proposals received from Eskom with 5km-wide corridors (centre lines shown) and alternatives).

Figure 10: Date: October 2008 (**Route change (scoping phase):** The scoping phase Southern Corridor was amended to provide an alternative linking the eastern part of the Southern Corridor.

The scoping phase Southern Corridor was amended to provide an alternative linking the eastern part of the Southern Corridor to the Northern Corridor to potentially allow all five lines to be routed through the Northern Corridor.

Route change based on: Feedback from the NMBMM regarding potential technical constraints in the area around Uitenhage / Despatch, hence another alternative for the Southern Corridor to reach Grassridge would need to be considered.

Figure 11: Date: October 2008 (**Route change (scoping phase):** The proposed Port Elizabeth Substation area moved from the Bethelsdorp area to the Blue Horizon Bay area.

Route change based on: Feedback received from the Nelson Mandela Bay Metro that the original substation study area as proposed by Eskom did not fit in with the Metro's SDF and urban development plans.)

Figure 12: Date: October 2008 (**Route change (scoping phase)**: The Port Elizabeth Substation study area was amended (enlarged) to extend up to the north of the N2 to the Fitches Corner Area.

Route change based on: I&AP feedback from Calvus Properties developers that the area around Blue Horizon Bay was potentially planned to be developed as a game reserve.

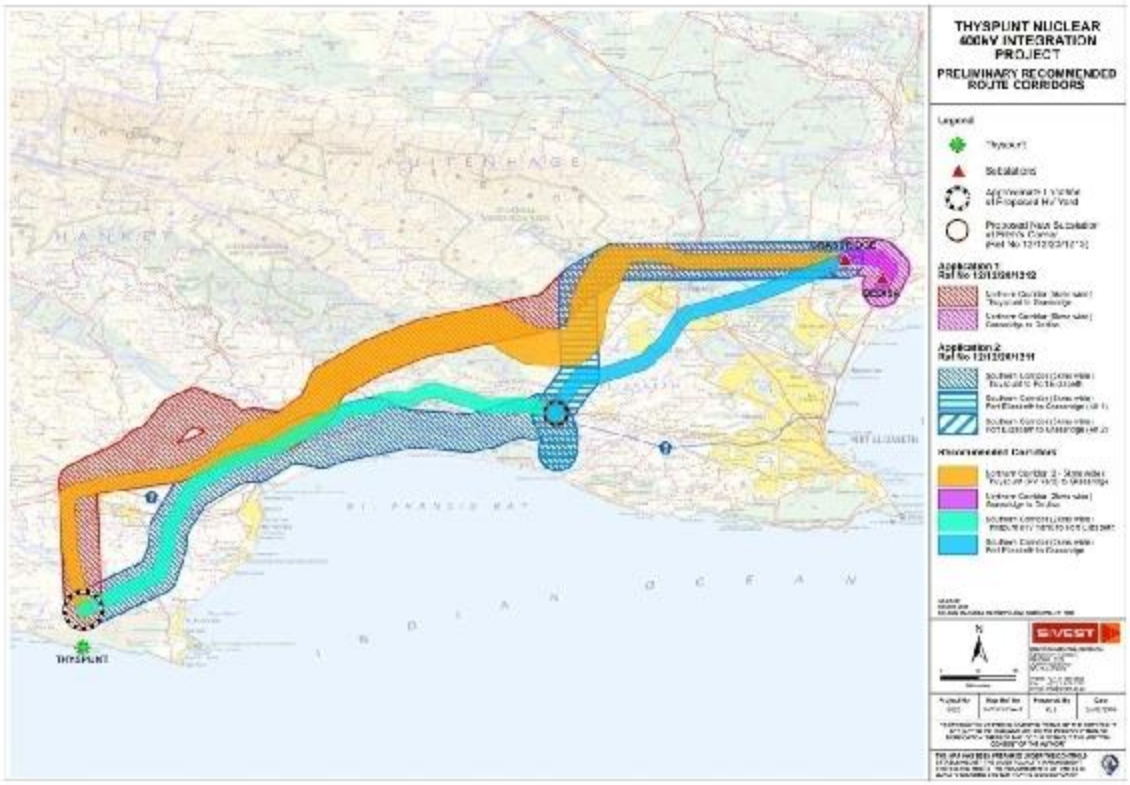


Figure 13: Date of Issue 24 February 2009 (**Route change (scoping phase):** Map shows route alignment recommendations for EIA-phase corridors arising from the scoping-phase specialist workshop held in February 2009.

Route change based on: Specialist input regarding environmentally sensitive areas; these parts of the study area were avoided by the EIA-phase corridors.

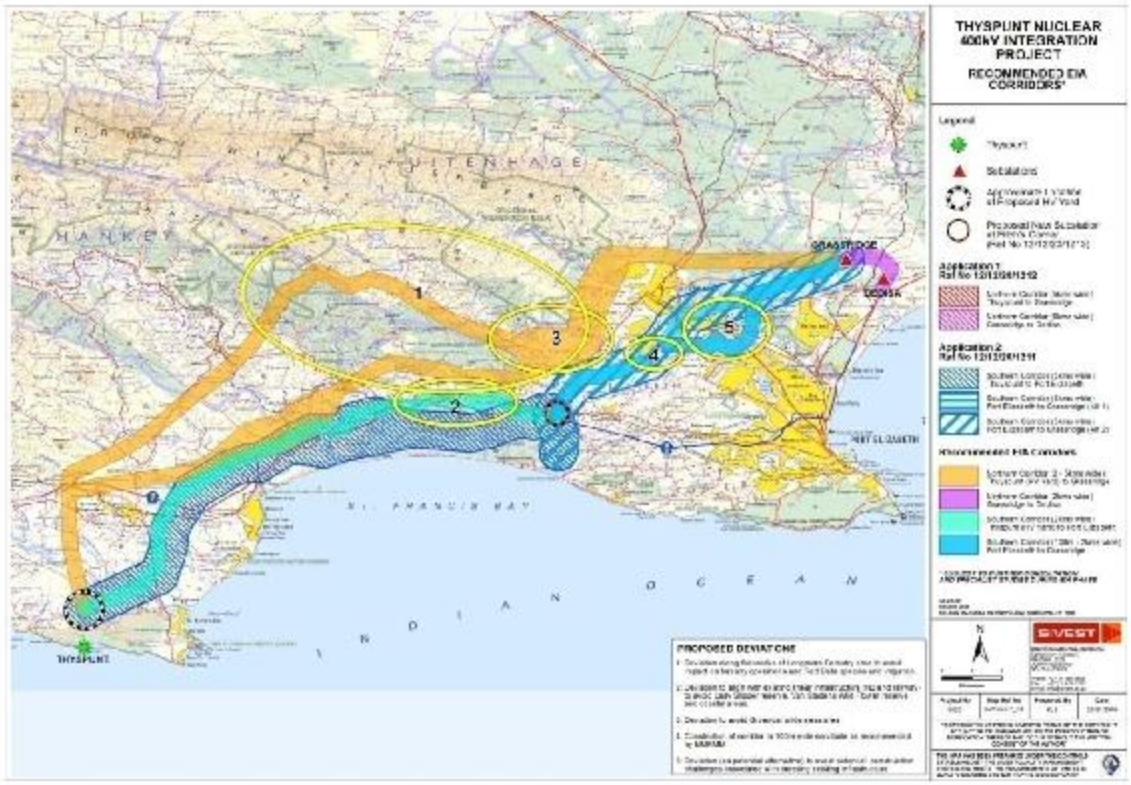


Figure 14: Date: April 2009 (**Route change (scoping phase):** Final recommended route alignment as presented in the Draft Scoping Report with 5 route change areas.

Route change based on:

I&AP feedback:

- Feedback from MTO (Mountain to Oceans) requesting that the Longmore Forest Firebreaks be utilised to route the northern corridor alternatives
- Feedback from I&APs that a number of sensitive areas should be avoided including the Lady Slipper NHS, the Van Stadens Wild Flower Reserve and the coastal areas
- Feedback from stakeholders (EC Parks) that the Groendal Wilderness Area should be avoided
- Feedback from the proposed Hopewell Conservancy and the NMBMM that the proposed conservancy should be avoided
- Feedback from the NMBMM regarding construction challenges through the Despatch / Uitenhage / Swartkops River area

Figure 15: Date: November 2009 (**Route change (scoping phase):** A number of route changes in the final Scoping Report)

Route changes based on:

- Grassridge-Dedisa corridor amended to conform to existing Eskom servitude.
- Southern Corridor – PE to Grassridge; Alternative running north of Despatch is removed due to technical (space constraints).
- The Northern Corridor in the Longmore Northern Firebreak was slightly altered based on feedback from MTO.
- An additional study area (alternative) for the proposed Port Elizabeth Substation in the area to the east of KwaNobuhle was added based on feedback from the NMBMM.

Figure 16: Date: November 2009: **Route change (EIA phase):** A new alternative added to the Southern Corridor between the Thyspunt HV: Yard and the Gamtoos Valley

Route change based on:

- Feedback from I&APs in the scoping phase comment period regarding environmental sensitivities (especially from a tourism and visual impact perspective) and no-go areas around St Francis Bay and the Krom River Valley.

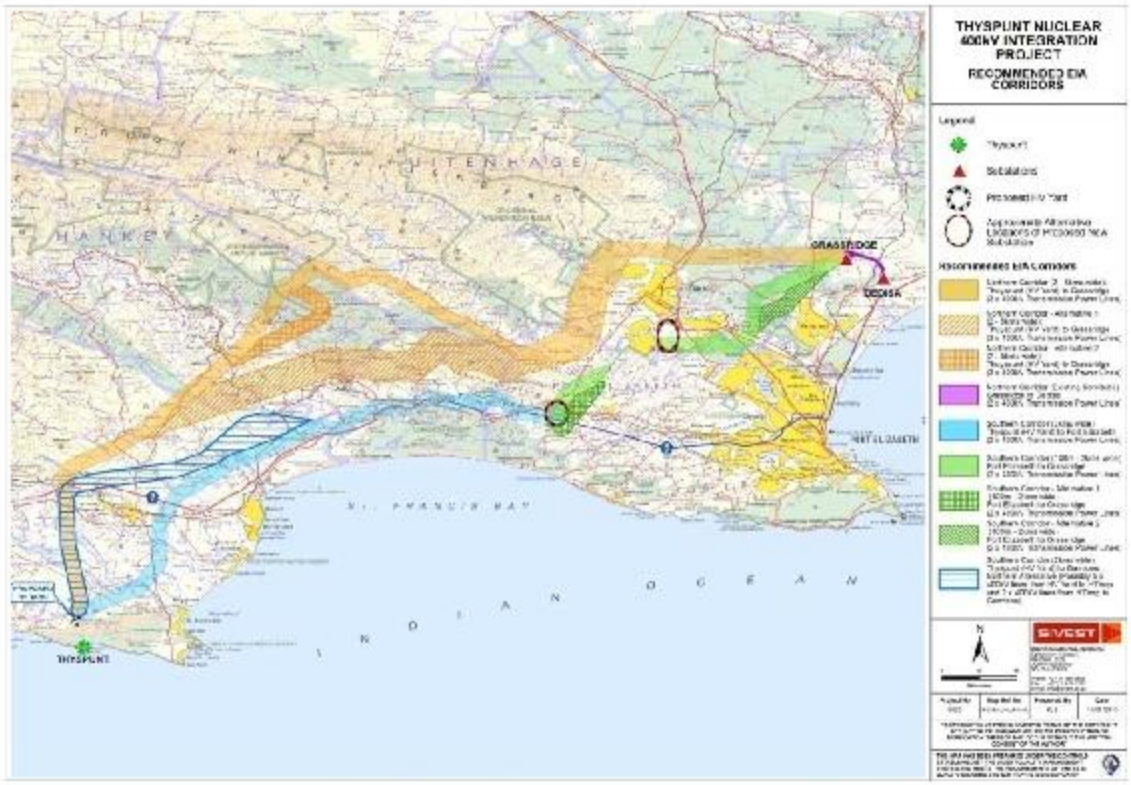


Figure 17: Date: January 2010 **Route Change (EIA Phase)**: Amendments to the Northern Corridor to provide two new alternatives (Alternative 1 – southern firebreak & Alternative 2) in the Longmore area: Amendments to the Southern Corridor: PE-Grassridge section to provide two new alternatives (in the Fitches Corner Area and north of Motherwell)

Route changes based on:

- Feedback from stakeholders (EC Parks) and I&APs in the Elands River Valley regarding biophysical and visual / tourism sensitivities in the Elands River / northern Longmore Area and in the Stinkhoutberg Nature Reserve Area.
- Feedback from I&APs in the Fitches Corner area regarding the potential for smallholdings to be 'sterilised' by the proposed lines.

Figure 18: Date: September 2010: **Route change (EIA phase)**: Amendments to the Northern Corridor to allow southern Longmore Alternative (Alt 1) to align with the southern firebreaks of Longmore Forest.

Route change based on:

- Feedback from stakeholders (MTO)

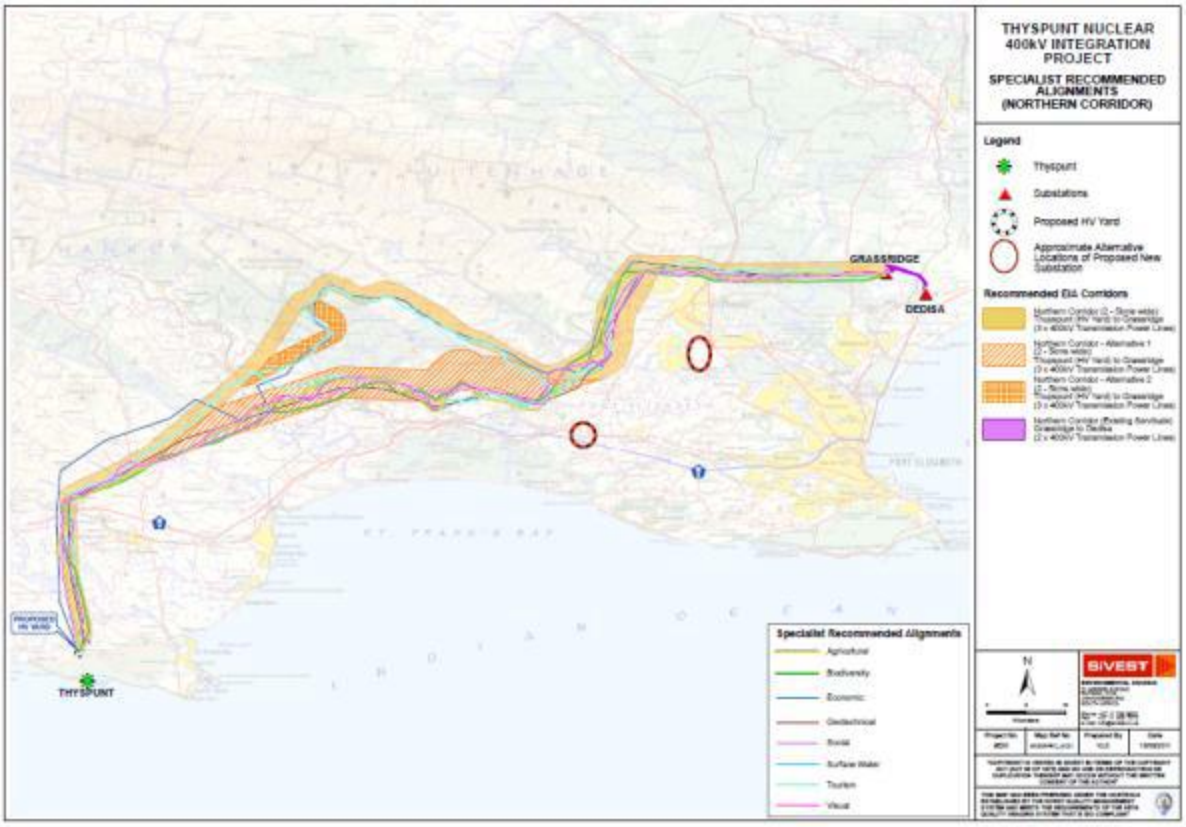


Figure 19: Date January 2011: Route Change (EIA Phase): Map shows specialist alignments for each environmental parameter as discussed at the EIA specialist workshop

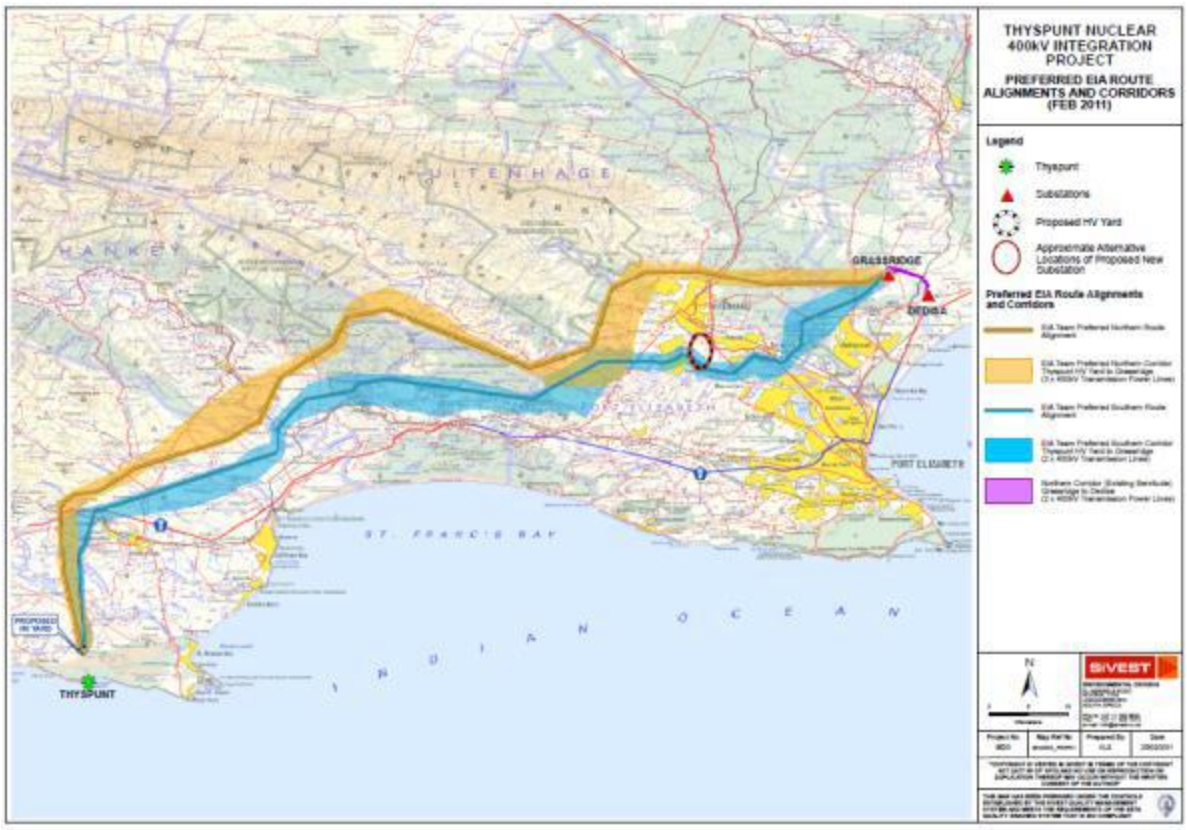


Figure 20: Date: February 2011: **Route Change (EIA Phase)**: Creation of the EIA Team-preferred alignments for the Northern and Southern Corridors and the revision of both Corridors in certain areas

Route changes based on:

- Specialist Feedback in the EIA Phase specialist workshop (January 2011); the economic and social specialists identified certain parts of the Southern Corridor as environmental fatal flaws; they recommended that part of the Southern Corridor be shifted into the Northern Corridor Alt 1 (Longmore Southern Firebreak Alternative) and that the Northern Corridor run in the northern firebreak alternative. The visual and tourism specialists identified fatal flaws in the St Bay and Elands River Valley Areas.
- The creation of the EIA team alignment was done to meet requests of numerous I&APs for proposed actual alignments.
- The alignments were based on consideration of parameter-specific alignments provided by each specialist.

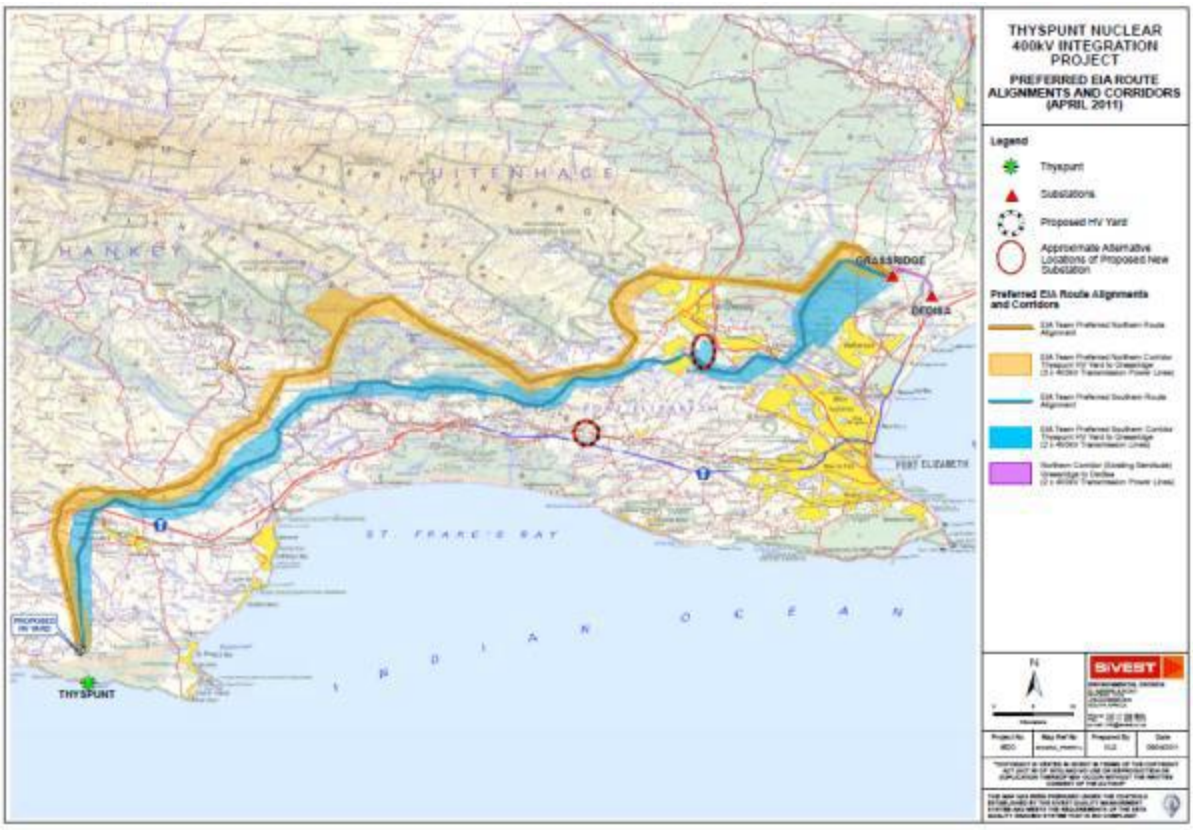


Figure 21: Date: April 2011: **Route Change (EIA Phase)**: Revision of the EIA Team-preferred alignments and corridors for the DEIR

Route changes based on:

- The alignments were changed based on feedback from landowners at a series of landowner open houses held in February 2011 and March 2011. The corridors were revised accordingly to avoid newly-identified sensitive areas.

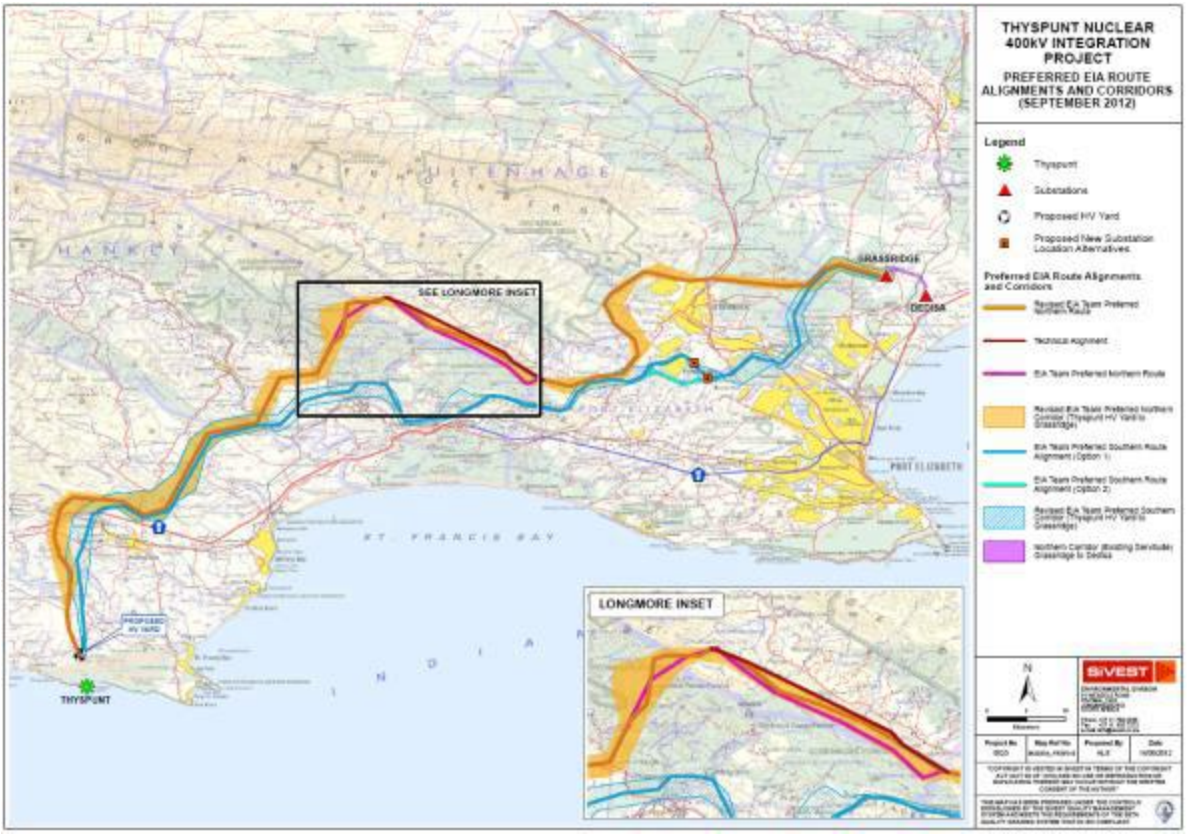


Figure 22: Date: September 2012: **Route Change (EIA Phase)**: Revised EIA Team-preferred routes and corridors for Revised DEIR following the public review period of the DEIR

Route changes based on:

I&AP feedback:

- Feedback from meeting with Innowind to avoid the Grassridge 1 wind farm project.
- The route was moved following NMBMM's request to run the route along the proposed service road north of Rosedale/ Kamesh and Vanes Estate (Uitenhage).
- To the north of Uitenhage, the corridor was narrowed and the route moved slightly south to avoid the Springs Nature Reserve.
- Feedback from EMF feedback meeting with the Tiryville community. The community requested that the corridor be rerouted away from the Tiryville Township. Therefore the corridor in this area has been narrowed and moved slightly northwest.
- In the southern part of the Kruis rivier area the route was moved slightly westwards to avoid the proposed Chicken farm by Sovereign Foods.
- In the Wincanton/ Ruigte vlei area, the route was moved southeast to avoid game farms in the area.
- In the Longmore area, the route was moved slightly north to avoid forestry compartments. DAFF and Cape Pine (formerly MTO) objected to running power lines within forestry compartments due to the strong commercial impact. They thus recommend that the route run through the Longmore Northern Firebreak, on top of the ridge at the southern edge of the Elands River Valley. However, power lines in this area would be highly visible and arguably visually intrusive to the receptors within the valley. Moreover much of the valley

is a conservancy. As such, the residents and the conservancy have voiced their objection to the power lines running within the viewshed of the valley.

- In light of the above, three possible alignment options were proposed in the Longmore area.
- In the area north of N2 and Humansdorp, the alignment was shifted southwards to avoid Rondebosch Farm.
- North of the HV yard, the corridor has been narrowed and the alignment moved slightly west to account for the Red Cap wind farm.

Context of Changes to the Corridors and alignment along the Longmore Forest Northern Firebreak

Since the completion of the specialist studies for the TTLIP in the middle of 2011, the SiVEST EIA Team received comments and engaged in consultation with Cape Pine (formerly Mountain to Oceans - MTO). MTO are the forestry operators within the Longmore Forest. Their comments pertained to the proposed alignment of the Northern and Southern Corridors through the Longmore Forest. One of the key issues raised queried the routing of the lines through the forestry compartments within the Longmore Forest. Cape Pine recommended that the proposed power lines should not traverse the active forestry compartments at all, due to the commercial impact of a loss of productive forestry land and associated job losses to a decline in production. Cape Pine expressed that as managers of the Longmore Forest it would be acceptable to them if the power lines were aligned within the firebreaks that are located on both the northern and southern periphery of the Longmore Forest. Firebreaks are areas of land largely falling within the boundaries of the Longmore Forest that are not planted, but where the natural fynbos vegetation is managed to reduce the risk of veld fires entering the plantation areas. The Northern Firebreak of the Longmore Forest runs along the ridge at the southern edge of the Elands River Valley, the area immediately to the north of the Longmore Forest that lies between it and the Groendal Wilderness Area further to the north. This ridge visually 'encloses' the Elands River Valley and is the most prominent landscape feature when looking southwards from within the valley. Power lines placed along this ridge would thus be highly visible, as they would 'break' the horizon, as viewed from many parts of the Elands Valley to the north.

The visual impact study for the TTLIP concluded that the routing of the power lines on the crest of the ridge on the Longmore Northern Firebreak (and on the southern edge of the Elands River Valley) would constitute a visual fatal flaw – i.e. an impact that would be unable to be mitigated. This was identified in the context of the visual sensitivity of the Elands River Valley that is explored further below. The Tourism study also identified the routing of the proposed power lines along this ridge as a fatal flaw, due to the potential visual-based impact of the power lines on the tourism environment within the Elands River Valley. As a result the Northern Corridor as presented within the DEIR was aligned away from the crest of the ridge, which entailed that it mostly ran within the forestry compartments. The EIA Team-preferred alignment as presented ran within the forestry compartments, and the corridor did not extend onto the top of the ridge, in order to ensure that the power lines would not be visible from the valley.

This alignment precipitated the comments of Cape Pine on the DEIR, as supported by the Department of Agriculture, Forestry and Fisheries (DAFF). Based on the concerns raised by these stakeholders meetings and a site visit to the Longmore Forest between Eskom, SiVEST and Cape

Pine were convened in early 2012. As a result of these engagements, SiVEST and Eskom agreed to consider the possibility of moving the corridors out of the forestry compartments and into the firebreak. As a result, Eskom technical staff identified the need to further investigate the technical feasibility of re-routing the corridors out of the forestry compartments, and identified the best way to undertake this technical assessment was through the undertaking of a LIDAR survey to accurately determine the terrain within the area in question and to undertake a helicopter fly-over. Following the helicopter fly-over Eskom technical staff proposed a alignment completely within the firebreak and not affecting the compartments at all, but which largely ran on the crest of the ridge and even on the northern facing-slopes of the ridge that run down into the valley. Around the same time, the EIA Team-preferred alignment was altered to take into account both the concerns of Cape Pine, while still considering the need to restrict the visual prominence of the lines on the ridge. This alignment runs along the edge of the compartments as far as possible to avoid affecting them, but cutting across small sections of the edge of the compartments. Where the northern firebreak is wide the alignment was routed in areas that reduced the topographical elevation and thus visibility of the proposed lines. These two alignment options, along with the older EIA Team-preferred alignment, provide a set of potential alignment options within this part of the Northern Corridor. The option alignments have been named as follows:

- Technical Alignment
- Revised EIA Team Preferred Northern Alignment
- EIA Team Preferred Northern Alignment

The Figure 23 below indicates the routing of these alignments.

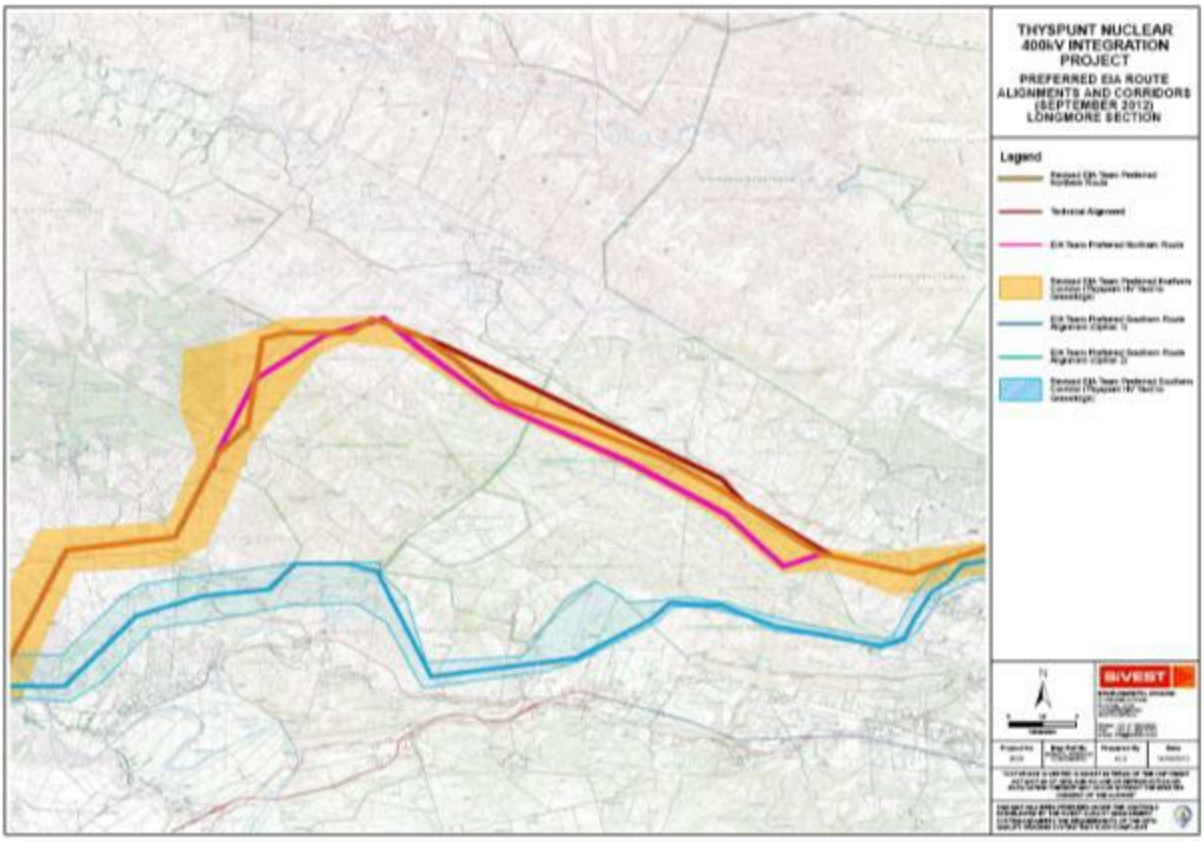


Figure 23: Power line Alignment in the context of the Longmore Northern Firebreak and the Elands River Valley.

6.4.1 Choosing of Preferred Alternatives and Creation and Development of the EIA Team-preferred route

The EIA Team preferred alignment was created for both corridors based on consideration of a number of factors including input from project specialists regarding their respective disciplines, technical feedback from Eskom's network planners and feedback from potentially affected landowners and other stakeholders. The section below details the process of creating the EIA Team-preferred alignment for the Northern Corridor.

The need for the creation of a proposed alignment arose based on a number of requests from stakeholders and potentially affected landowners who expressed the desire to see an alignment of three lines on a map rather than simply an assessment corridor in which numerous alignment permutations could occur. These stakeholders stated that it would be very difficult to comment on a wide corridor and felt that this was insufficient to allow them to comment on the proposed development.

As such the process of commencing a proposed alignment for the three parallel lines was commenced. In early January 2011, when most of the project's specialist studies were either complete, or at an advanced stage, the SiVEST EIA Team and all of the project specialists convened in a specialist workshop. All specialists were asked to come to the workshop with any problem areas or fatal flaw ('no-go') areas identified, and with preferred alternatives (where alternatives had been presented for assessment). Prior to the workshop, all specialists were asked to indicate an optimal alignment for the proposed power lines within the corridors (and outside of the corridors if environmental factors necessitated this).

During the workshop a number of problem areas and certain fatal flaws were identified by a number of specialists. Table 3 below indicates the fatal flaw (no-go areas) or areas potentially associated with high impacts as identified by each specialist. These were assimilated onto a map of the corridors for comparative assessment in the workshop.

In this context a 'fatal flaw' must be defined; an environmental fatal flaw is defined as an impact or series of impacts that can be associated with a certain defined area that are of such a magnitude, intensity or significance that it cannot be mitigated to an acceptable level. In this context an environmental fatal flaw would result in a proposed development resulting in an unacceptably high level of impact, if it was not able to be avoided.

Table 3: Problem Areas within the study area identified at the specialist workshop

Specialist Parameter	Problem Areas and Fatal Flaws Identified
Tourism	**Northern Corridor –** Hankey Area – cluster of tourism attractions

Specialist Parameter	Problem Areas and Fatal Flaws Identified
	Northern Corridor – Stinkhoutberg Nature Reserve (part of proposed World Heritage Site)
	Northern Corridor – The Elands River Valley (Conservancy) – **Fatal Flaw** – cluster of tourism facilities and tourism potential
	Northern Corridor – Groendal Wilderness Area
	Southern Corridor – Lombardini Game Park – tourism establishment
	Southern Corridor – The coastal area east of the Gamtoos River – tourism potential and facilities
	Southern Corridor – The Van Stadens / Lady Slipper area – cluster of tourism facilities
Visual	**Northern Corridor –** Longmore Forest \ Elands River Valley Conservancy Area - **Fatal Flaw** - If lines on a high elevation → associated high visual impact on numerous receptors.
	Southern Corridor – Krom River Area behind St Francis Bay – **Fatal Flaw** - High visual impacts on numerous receptors.
	Southern Corridor Van Stadens Gorge and Lady Slipper area - High visual impacts on numerous receptors.
Heritage	**Northern and Southern Corridor –** Area around the Thyspunt HV yard
	Northern and Southern Corridor - The Kabeljous River Valley
	Northern Corridor - Amanzi Springs.
Social	**Northern and Southern Corridor –** Area south-west of Humansdorp – extensive irrigated agriculture
	Northern Corridor – R330 area west of Hankey Pass - extensive irrigated agriculture
	Northern Corridor – Gamtoos River Valley near Hankey - extensive irrigated agriculture
	Northern Corridor – Kruis Rivier area west of Uitenhage – extensive agriculture, numerous smallholdings
	Southern Corridor – Gamtoos Valley along the N2 – extensive irrigated agriculture – **Fatal Flaw**
	Southern Corridor – Thornhill Area and Van Stadens Gorge area – numerous structures and the

Specialist Parameter	Problem Areas and Fatal Flaws Identified
	Crossways development – **Fatal Flaw**
	Southern Corridor – Lady Slipper area – numerous structures and smallholdings – **Fatal Flaw**
	Southern Corridor – Rocklands and Fitches Corner area – numerous structures and smallholdings – **Fatal Flaw**
	Southern Corridor – Area south-east of KwaNobuhle – informal houses in proposed servitude area
	Southern Corridor - KwaDesi area - informal houses in proposed servitude area
	Southern Corridor - Area north of Motherwell - - informal houses in proposed servitude area
Economic	**Northern Corridor –** Area to the north-east of Humansdorp – proposed nature reserve development
	Southern Corridor – Entire coastal belt from St Francis Bay to Blue Horizon Bay – Density of human settlement – **Fatal Flaw**
Agricultural Potential	**Northern and Southern Corridor –** Area south-west of Humansdorp – Extensive high potential agriculture
	Northern Corridor – R330 area west of Hankey Pass - extensive high potential agriculture
	Northern Corridor – Gamtoos River Valley near Hankey – extensive high potential agriculture
	Northern Corridor – Area north of Thornhill - extensive high potential agriculture
	Northern Corridor – Kruis Rivier south-west of Uitenhage – extensive high potential agriculture
	Northern Corridor – Klein Rivier east of Hankey – extensive high potential agriculture
	Southern Corridor – Area south-east and east of Humansdorp – extensive high potential agriculture
	Southern Corridor – The Gamtoos River Valley along the Southern Corridor – extensive high potential agriculture
	Southern Corridor – Area east of Thornhill – extensive high potential agriculture
	Southern Corridor – Area around Fitches Corner – extensive high potential agriculture
	Southern Corridor – Swartkops River Valley east of Despatch – extensive high potential agriculture
Avifauna	**Northern Corridor –**

Specialist Parameter	Problem Areas and Fatal Flaws Identified
	Important Bird Area (IBA) Kouga-Baviaanskloof complex IBA
	Northern Corridor – Protected areas including Loerie Dam Nature Reserve as well as the Longmore state forest, the Van Stadensberg Natural Heritage Site and the Stinkhoutberg Nature Reserve.
	Southern Corridor – Proximity of two IBA's including: Maitland-Gamtoos coast IBA and the Swartkops Estuary, Redhouse and Chatty Saltpans IBA.
	Southern Corridor – Protected areas including Kabeljous River Natural Heritage Site, the Eastcot Private nature reserve, Kromme Island estate private nature reserve and the Kromme River Mouth Private Nature Reserve.
Biodiversity	**Northern Corridor –** The area to the north-east of Humansdorp – area of largely natural vegetation
	Northern Corridor – The Stinkhoutberg Nature Reserve – highly natural area
	Northern Corridor – The Longmore Northern Firebreak on the southern side of the Elands River Valley – relict fynbos vegetation providing habitat for threatened fauna
	Northern Corridor – The area west of Grassridge – intact thicket vegetation
Geology	**Northern Corridor –** Entire Longmore area – steep slopes = erosion potential
Surface Water	**Northern and Southern Corridor –** Area to the north of the Thyspunt HV Yard - Valley bottom wetland system too wide to be spanned

All specialists indicated their preferences in terms of preferred alternatives within the respective corridors, as indicated in Table 4below.

Table 4: Preferred Alternatives in the Northern Corridor

Specialist Study	Preferred Alternatives
Agricultural Potential	Alternative 1
Heritage	No Preference
Avifauna	Alternative 1
Surface water	No preference
Biodiversity	Alternative 2
Geotechnical	Alternative 1
Palaeontology	No preference
Socio-economic	Alternative 1
Tourism	Alternative 1

Visual	Alternative 1

Under normal circumstances, a general discussion would have been held to discuss which of the alternatives should be selected as the preferred alternative in the Longmore area, as a number of studies conflicted in terms of which alternative was preferred in terms of that specific parameter. However the social and economic specialists had indicated significant problem areas within parts of the Southern Corridor from a social and economic perspective due to the level of human habitation and level of development (including proposed development) within the 'coastal belt' being associated with significant potential social and economic impacts. As stated by the socio-economic reports the only feasible way to negate or prevent these fatal flaws from occurring, thus allowing the project to be able to proceed was to shift the Southern Corridor away from the areas associated with the fatal flaws. The presence of multiple alternatives within the Northern Corridor would potentially allow both of the Northern Corridor alternative sections to be used to route both corridors, thus avoiding the areas to the south associated with high impacts.

As a result of these issues identified by the socio-economic study, the social and economic specialists made a strong recommendation that part of the Southern Corridor be re-routed into Alternative 1 of the Northern Corridor (i.e. into the southern Longmore firebreak alternative) and that the Northern Corridor run accordingly through the northern firebreak alternative (through Alternative 3). These proposals were discussed by all present at the meeting. In the interests of minimising significant social and economic impacts associated with the proposed power lines, these proposed route changes were adopted by the EIA team. This entailed that the preferences in terms of alternatives indicated by each specialist within the Northern Corridor (Longmore Area) were made irrelevant. However the fatal flaws as indicated by the tourism and visual specialists that fed into their preference of an Alternative in the Longmore area were discussed; as indicated in section 12.1 below (a discussion of fatal flaws and how these were mitigated through the project) a change to the corridor in part of Alternative 3 was found and agreed upon to negate the fatal flaw from a visual and tourism perspective.

It should also be noted that the problem areas identified by a number of specialists in certain parts of the Northern Corridor were discussed. Where possible the routing changes as recommended by the specialists were adopted, and sections of the Northern Corridor were changed accordingly. An example of this occurred where the Northern Corridor crossed the Gamtoos Valley; it was shifted to the south-east to avoid areas of high potential agriculture.

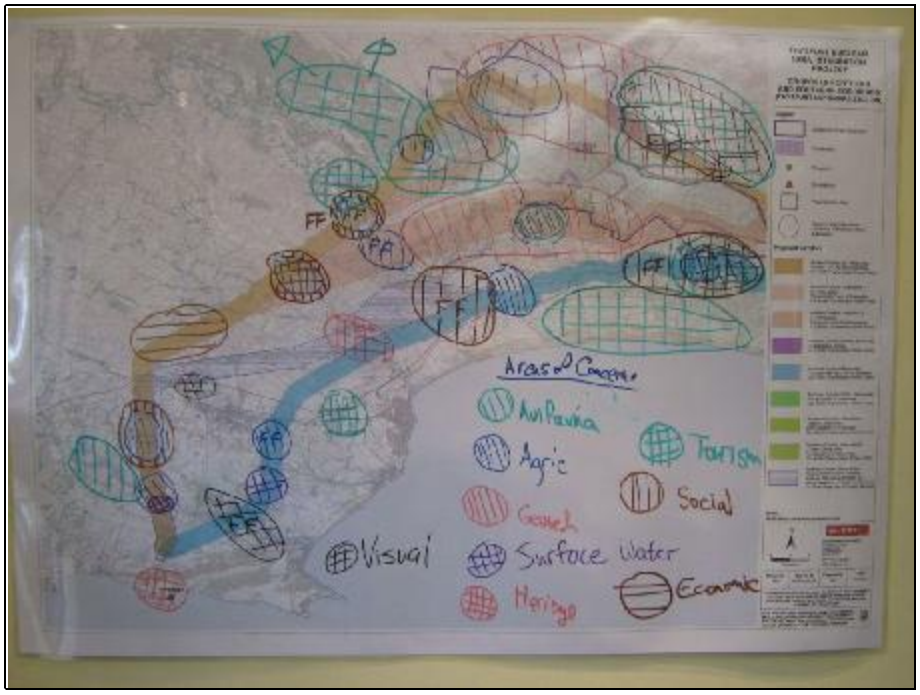


Figure 24: Laminated map for the Specialist Workshop showing specialists' areas of concern in the western part of the study area

Taking into account the outcome of the specialist workshop that Alternative 3 be used for the routing of the Northern Corridor through the Longmore area, a detailed potential alignment for the three lines in this part of the corridor and the rest of the corridor was now able to be undertaken.

Taking into account both the individual problem areas identified by the respective specialists and their alignment preferences, the EIA Team-preferred alignment for both corridors was created. This alignment for the Northern Corridor attempted to avoid a number of problem areas that had been identified by a number of specialists in their reports. The creation of the EIA Team-preferred alignment was undertaken though the use of GIS spatial analysis. Each specialist provided a shapefile or kml with their preferred alignment for each corridor. These various alignments were overlayed within GIS and layers of problem areas as indicated by each specialist were created. Considering these optimal alignments and problem areas, a draft alignment shapefile for each corridor (the first revision of the EIA Team-preferred alignment) was thus created.

The creation of the EIA Team-preferred alignment had to take a number of sometimes contradictory environmental factors into account, and in this case a decision as to the more important factor had to be made. In this case the process of creating the alignment had to make a decision on which parameter was more important. The need to avoid certain areas of for example biodiversity and visual / tourism sensitivity have had to be weighed up against other prerogatives, for example the non-impacting of forestry operations. In these cases where collective similar requirements of a number of environmental parameters existed, these were prioritised above a contradicting single requirement of another environmental parameter. The scale of impact of the power lines on each contradicting parameter and the relative sensitivity of the parameter in that areas were also taken into account.

The Longmore Forest is one of these cases, where the need to avoid areas of visual and tourism sensitivity and areas of biodiversity importance (i.e. those parts of the firebreak that are not planted and consist of natural fynbos) had to be balanced against the requirement to avoid planted forestry as much as possible. In this case the collective requirements of the need to avoid biodiversity-sensitive areas within the firebreak, and those parts of the firebreak that would be visible to receptors in the Elands Valley to the north have overridden the need to avoid areas of forestry. In saying this, the EIA Team-preferred alignment has been aligned along the Longmore Firebreak where no other environmental factors had to be considered.

There were not very many other areas where this scenario cropped up, and as discussed in section 12 of this report, most sensitive areas and areas associated with fatal flaws were able to be avoided.

The EIA Team-preferred alignment should be seen as an optimal routing from an environmental perspective; a *proposed* routing for the respective sets of lines in the corridors that attempts to avoid all areas of environmental sensitivity and which is associated with the least possible degree of environmental impact. The table in section 12.2 below (which is based on Table 3 above), indicates the spatial relationship of the EIA Team-preferred alignment for the Northern Corridor to the problem areas identified.

It must be stressed that the EIA Team-preferred alignment is not necessarily the technically most optimal routing for the power lines, or the alignment that is most optimal from a purely commercial perspective – environmental issues have been the primary driver of seeking the most optimal alignment. The mandate of the EIA Team in this project is to find a routing that is associated with the lowest degree of environmental impact. It must also be noted that this is not the final alignment of the proposed power lines. The proponent (Eskom) is still seeking authorisation for the corridor in which to place a final alignment. As recommended below, it is however strongly recommended that the EIA Team-preferred alignment be utilised as the basis on which to finalise an alignment in the post Environmental Authorisation phase (should a positive EA be granted) as this has been subject to extensive landowner comment and feedback as described below.

In a similar way to the creation of the EIA Team-preferred alignment through GIS-based spatial analysis as described above, the boundaries of each of the corridors were altered to take account of the proposed changes to the routing as agreed to in the specialist workshop. Parts of the corridors that had been identified as being fatal flaws or no-go areas (e.g. the Southern Corridor Alternative that ran north-east from the Thyspunt HV Yard, traversing the area to the west of St Francis Bay and crossing the Krom River Valley) were discarded, and no longer form part of the latest revision of the corridors for the EIA. In many areas corridors were altered to not include or traverse areas that had been identified as environmentally sensitive or problematic (please refer to Table 5 below).

The EIA Team-preferred alignment was then sent to Eskom's route planners to check whether it was technically feasible. The route planners made some changes to the first draft of the proposed alignments for both corridors.

A series of landowner 'open houses' (a number of venues across the study area to which landowners were invited to view detailed maps which showed the EIA Team-preferred alignments and property

(cadastral) boundaries) were hosted in February 2011 to allow potentially-affected landowners to provide comment on the first draft of the proposed alignments. Landowners were encouraged to provide the EIA Team present at the open houses with feedback on any recommended changes to the alignments to take account of environmental sensitivities and other relevant information such as development plans on their properties, location of infrastructure that could be affected by the proposed alignments etc. Following this series of meetings and a few more consultations with landowners that had been unable to attend the series of meetings in March 2011, the EIA Team-preferred alignments as well as the respective corridors were revised to take account of the feedback that had been provided by landowners and other stakeholders. The latest corridors and proposed alignments were released for public comment in May 2011 and are presented in this report.

Any further feedback received and issues identified relating to the EIA Team-preferred alignments by I&APs and stakeholders during the public comment period of the Draft EIR will be assimilated once the public comment period is completed, and where necessary revisions to the alignments and corridors will be made. These revised routings will be submitted to the determining authority as part of the final EIR.

6.4.2 Presentation of route options within the Longmore Region of the Northern Corridor

With regards to the Northern Corridor, the main issue related to the routing of the proposed corridor and associated revised EIA Team-preferred alignment relate to the Northern Firebreak of the Longmore Forest. The SiVEST Team has undergone extensive consultation with Cape Pine (formerly Mountain to Oceans - MTO) and the Department of Forestry regarding the environmental feasibility of routing the proposed power lines through the Longmore Forest which is managed by Cape Pine. The Department and Cape Pine have lodged their objection to the power lines running through any of the forestry compartments, as according to them this would have a commercial impact on their operations that would result in job losses. As a result Eskom, Cape Pine and the SiVEST Team examined ways in which the proposed power lines could avoid the forestry areas. In the context of the Northern Corridor power line alignment through the Longmore Northern Firebreak as recommended by Cape Pine, this would place the power lines on top of the ridge at the southern edge of the Elands River Valley, thus making them highly visible and arguably visually intrusive to the receptors within the valley. Much of the valley is a conservancy and the residents and conservancy have voiced their objection to the power lines running within the viewshed of the valley.

In the Northern Firebreak of the Longmore Forest area, therefore options have been created to address the key environmental issues and to address each stakeholder concerns. The corridor is still considered feasible, and the revised EIA team preferred alignment has been included to lessen the impacts associated with both the forestry compartments and the Elands River Conservancy.

6.4.3 Implications for development of routing changes through the project

As can be seen from the above, sections of both corridors have undergone significant changes, mainly in response to submissions and issues raised by I&APs and other stakeholders. The process of route change has been an iterative one, with a number of changes occurring through the process. The route changes have been an essential part of the EIA to show transparency and accountability to the parties who had highlighted environmentally sensitive areas; to demonstrate that their feedback had been taken into account. The discarding of large parts of the corridors has demonstrated that the I&AP feedback has been taken into account. The table below indicates the no-go / fatal flaw areas that have been discarded through the EIA process. The creation of the EIA Team-preferred alignments for both corridors at the request of I&APs and the input of landowner feedback into this process has been a further step taken through the EIA to ensure that stakeholder and I&AP feedback has been taken into account.

Table 5: Parts of the corridors that have been discarded through the EIA process

Part of the Corridors that have been discarded	**Sensitive Issues / Potential Impacts identified**
The section of the Southern Corridor running 'behind' St Francis Bay and across the Krom River Valley	Visual impacts Tourism Impacts Social Impacts Economic Impacts
The Southern Corridor through the Gamtoos Valley along the N2/R102 corridor (Gamtoos Ferry area)	Agricultural Potential Impacts Visual Impacts Economic Impacts Social Impacts
The Southern Corridor that ran between the Gamtoos Valley in the west and the Rocklands / Fitches Corner area	Social Impacts Economic Impacts Tourism Impacts Visual Impacts Agricultural Potential Impacts
The (scoping phase) Southern Corridor east of the Gamtoos Valley and between the N2 / R102 and the coast	Visual Impacts Tourism Impacts Biodiversity Impacts Surface Water Impacts
The (scoping phase) Southern Corridor between Rocklands and KwaNobuhle (through the proposed Hopewell Conservancy)	Tourism Impacts Social Impacts Visual Impacts
The Southern Corridor that ran on the southern side of KwaNobuhle and along the northern boundary of the proposed Hopewell Conservancy development	Social Impacts Cultural Impacts Visual Impacts
The (scoping phase) Southern Corridor that traversed the Despatch / Uitenhage area	Social Impacts Economic Impacts
The Northern Corridor that directly traversed the Honeyville / Weltevreden Farms	Visual Impacts Socio-economic Impacts Heritage Impacts

Part of the Corridors that have been discarded	Sensitive Issues / Potential Impacts identified
The Northern Corridor that traversed the Hankey area and the part of the Gamtoos Valley near Hankey	Visual Impacts Agricultural Potential Impacts
The Northern Corridor that traversed the Stinkhoutberg Nature Reserve	Biodiversity Impacts
The Northern Corridor (especially the scoping-phase corridor) that traversed the Elands River Valley and the ridge on the southern side of the valley	Visual Impacts Tourism Impacts Biodiversity Impacts
The Northern Corridor that traversed the Wincanton Estate and Ruigte Vlei (Game) Farms and the (scoping phase) corridor that traversed parts of the Groendal Wilderness Area	Tourism Impacts Economic Impacts Biodiversity Impacts

In the context of the above changes and the history of stakeholder feedback in directing the process, it is critical that the latest Revised EIA Team-preferred alignments be used as the basis on which Eskom should finalise the power line alignments (should environmental authorisation for the project be granted). This will ensure that stakeholder and I&AP feedback and the associated environmental issues and sensitive areas will be considered in the final alignment and will ensure that the effort of seeking stakeholder and IAP feedback and the time spent by these parties in providing feedback to the project team will not have been wasted.

7 DESCRIPTION OF THE ENVIRONMENT

7.1 Regional Locality

As mentioned previously, the proposed project is located in the Eastern Cape Province. Due to the mostly linear nature of the project, the study area covers an extensive amount of land and extends into the Nelson Mandela Bay Metropolitan Municipality and the Cacadu District Municipality (the Kouga Local Municipality and a very small part of the Aberdeen Plain District Management Area-ECDMA 10).

The study area comprises a large area and includes the towns of Port Elizabeth, Uitenhage, Despatch, Humansdorp, St Francis Bay and Jeffrey's Bay. Please refer to the locality map, Figure 1 (Chapter 1).

7.2 Site Description

Land use and land cover are varied due to the study area being so large. Farming predominates, with cattle and sheep farming, as well as some crop cultivation being the most common land use. Other land uses include forestry and private game farms or nature reserves as well as urban areas. In terms of vegetation, much of the area has been transformed by farming, invasive aliens and urban land use. Areas of high vegetative biodiversity include the area surrounding Thyspunt, some isolated areas near the Gamtoos River and Geelhoutboom River. Excluding Thyspunt, the high biodiversity areas tend to be restricted to inclines such as ravines and steep hillsides, that is, areas that are unsuitable for other land uses. However, a number of nature reserves are located in the study area. These include the Van Stadens Wildflower Reserve, the Coega Butterfly Reserve, the Elands River Forest Reserve, Loerie Dam Nature Reserve, Lady Slipper Nature Reserve, Springs Nature Reserve, Stinkhoutberg Nature Reserve and the Groendal Wilderness Area.

7.3 Climate

The study area has a mild oceanic climate and lies between the summer and winter rainfall regions of South Africa. The study area receives moderate rainfall all year and has a Mean Annual Precipitation (MAP) of approximately 630 mm per year with an average of 9 rainfall days per month. A comparison between the Port Elizabeth and Jeffrey's Bay stations indicates that precipitation and temperature do not vary significantly over the study area (Table 6 and Table 7). Rainfall does however tend to decrease in a northerly direction (i.e. as one moves inland). Winters are generally mild and summers are warm but considerably less humid and hot than the northern parts of the South African Coast. Average daily temperatures range from 25°C in summer to 20°C in winter. Average night time temperatures drop to around 8°C during winter (Table 6 and Table 7).

Table 6: Mean monthly precipitation and daily maximum and minimum temperatures for Port Elizabeth (SAWS, 2010)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	36	40	54	58	59	62	47	64	62	59	49	34	**624**
Average Daily Maximum (^{o}C)	25	25	25	23	22	20	20	20	20	21	22	24	**22**
Average Daily Minimum (^{o}C)	18	18	17	14	12	9	9	10	11	13	15	16	**14**

Table 7: Mean monthly precipitation and daily maximum and minimum temperatures for Jeffrey's Bay (SA-Explorer, 2010)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	36	37	49	54	55	51	56	64	69	69	52	40	**631**
Average Daily Maximum (^{o}C)	24	25	24	23	21	20	19	19	19	20	22	23	**22**
Average Daily Minimum (^{o}C)	16	15	15	13	11	9	8	9	10	12	13	15	**14**

Table 8: Mean monthly precipitation and daily maximum and minimum temperatures for Uitenhage (SA-Explorer, 2010).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	23	29	40	34	19	17	19	23	29	38	33	27	**331**
Average Daily Maximum (^{o}C)	27	27	26	24	22	20	20	21	21	22	24	26	**23**
Average Daily Minimum (^{o}C)	16	16	15	13	10	7	7	8	10	12	13	15	**12**

7.4 Geology

This Geology study was conducted by Carlo Fourie and Johan Hattingh of Creo Design and a detailed report is provided in Appendix 6.

- Geology

The lithotypes occurring in this study area has been described by following the convention by which the rocks are described from the oldest to the youngest. The geology comprises almost entirely of sedimentary units spanning a period of some 500 million years.

The area has been subjected to several phases of tectonic activity with the most conspicuous the compressive forces that resulted in the formation of the prominent Cape Fold mountains.

This event was followed in short succession by the rifting forces that resulted in the fragmentation of the Gondwana Super continent creating high sedimentation rates in basins along this southern margin of the newly formed continent. The geology within the proposed corridors is highlighted in Figure 25.

- Gamtoos Group

Inliers of the Late Proterozoic Gamtoos Group are exposed along a 110-km-long strip extending from the eastern end of the Baviaans Kloof to the coast south-west of Port Elizabeth. This group seems to be overturned as a whole with a faulted lower boundary and a paraconformable or unconformable upper contact.

Because of the structural complexity of the area and poor exposures, thicknesses for the group as a whole and for the four constituent formations are uncertain. At least several hundred metres are probably present. The stratigraphy, initially established has since been modified.

The following formations are present within the Gamtoos Group (more detail with regards to each formation is provided in the geology specialist report):

i. Lime Bank Formation
ii. Kleinrivier formation

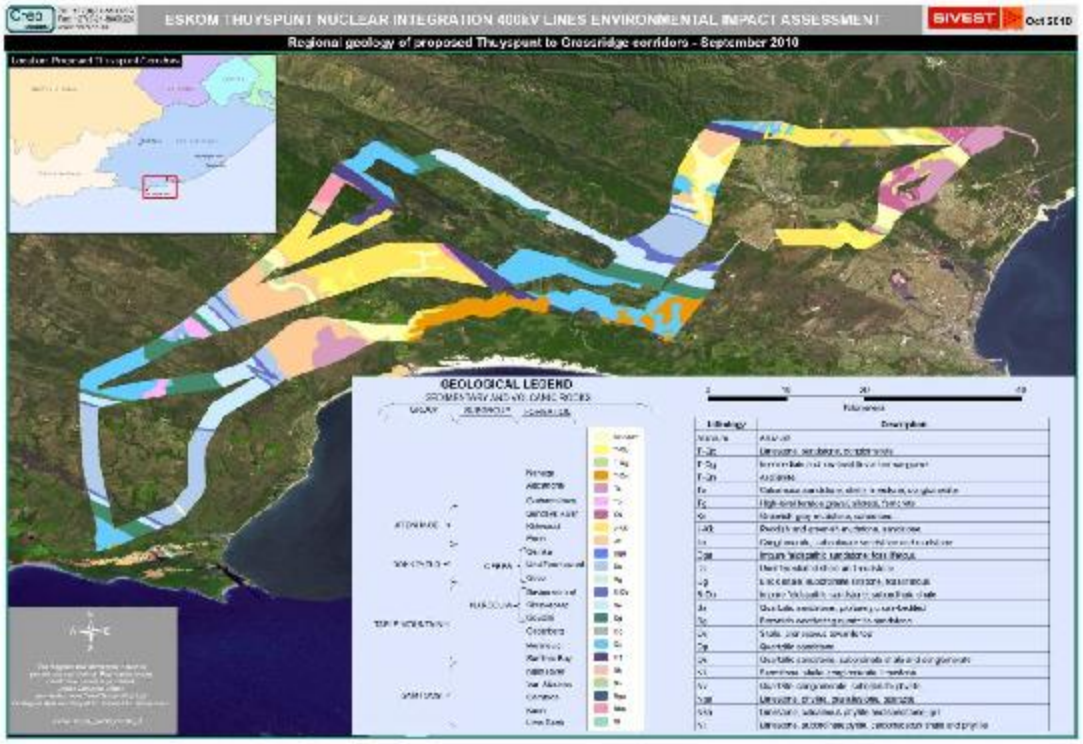


Figure 25: Geology within the proposed corridors

iii. Kaan Formation
iv. Van Stadens formation

- Cape Supergroup

The following formations are present within the Cape Supergroup (more detail with regards to each formation is provided in the geology specialist report):

i. Table Mountain Group

- Sardinia Bay formation
- Peninsula Sandstone Formation
- Cedarberg Shale formation
- Nardouw subgroup
    a. Goudini sandstone formation
    b. Skurweberg sandstone formation
    c. Baviaanskloof formation

- Bokkeveld Group

In contrast to the Table Mountain Group the Bokkeveld Group consists of dark-grey shales with intervening sandstone units.

It is subdivided into a lower Ceres Subgroup, characterised by marine invertebrate fossils and lateral continuity of its six formations, and an upper Traka Subgroup consisting of three formations in the Eastern Cape.

The following formations are present within the Bokkeveld Group (more detail with regards to each formation is provided in the geology specialist report):

i. Ceres subgroup

- Uitenhage Group

Deposits of this group cover an area of approximately 4 000km^2 in the 600km^2 in the Gamtoos Basin. These Late Jurassic-Early Cretaceous deposits, which are not confined to the land only, area partly, fault controlled, and seismic work and drilling proved the Algoa Basin to consist of two structural sub-basins onshore, namely the Sundays River Trough and Uitenhage Trough. The main faults follow the trend of the underlying Palaeozoic Cape rocks.

Deposition of the predominantly clastic succession commenced with coarse fanglomerates of the Enon Formation and distal sandstones and mudstones of the Kirkwood Formation and terminated with deposition of the marine sediment of the Sundays River Formation.

These deposits straddle the Jurassic-Cretaceous boundary.

The following formations are present within the Uitenhage Group Supergroup (more detail with regards to each formation is provided in the geology specialist report):

i. Enon conglomerate formation
ii. Kirkwood Formation
iii. Sundays River Formation

- Tertiary to recent Deposits

The following formations and other rock types are present within the Tertiary to recent Deposits (more detail with regards to each formation is provided in the geology specialist report):

i. Grahamstown Formation
ii. Alexandria Formation
iii. Nanaga formation
iv. Fluvial terrace deposits
v. Calcrete
vi. Screet
vii. Alluvium
viii. Aeolian Sand

- Structural Geology

The outcrop pattern and corresponding topography on the map disclose a dominant regional structure of east-south-east-trending folds and mountain chains.

Post-Cape lateral compression produced zones of intense folding with south-ward-dipping axial planes in the Cape and lower Karoo rocks. The folds are mainly confined to the Cape depositional basin, their intensity, and apparently also age, decreasing northwards. They were placed in the Permian to Triassic Periods.

The more competent quartzitic sandstones of the Table Mountain and Witteberg Groups constitute the cores of major anticlines, forming mountain chains due to resistance to weathering. Relatively incompetent formations overlying the quartzites suffered more intense deformation into disharmonic parasitic folds.

Tensional stresses, which followed the Cape folding, facilitated surface access for the Jurassic Suurberg volcanics of the Algoa Basin and initiated large south-ward-throwing strike faults which border the major fold zones on their southern sides. These faults are suggested to be reversals of those which triggered the Cape folding.

Displacements measure up to a few kilometres and it is against some of these fault scarps that the Late Mesozoic Uitenhage deposits accumulated. Their swing toward the south-east and the development of the graben-like Algoa and Gamtoos Basins are evidently related to the break-up of Gondwanaland.

Post-Cretaceous epeirogenic movements caused upward warping of the continent, gentle east-north-east-trending folds, and periodic seaward tilting of the coastal belt.

Neotectonic activity along the major fault zones, in particular those bordering the Cretaceous basins (Gamtoos and Algoa Basins and the Swartkops Sub-basin) are well documented (Hattingh & Goedhart 1997). They observed that local compressional faulting occurs along the Coega fault due to possible reactivation of the Agulhas Fracture Zone.

- Geohydrology

The study area is underlain by a wide range of rock types as described in the previous section with equally diverse ability to store groundwater and a large variation in groundwater quality. In general the rocks of the Table Mountain Group have the highest ground water yield potential and the best ground water quality with electrical conductivity of less than 100 mS/m.

  - The Bokkeveld Group rocks, with exception of the Sandstone units with characteristics similar to the Table Mountain Group rocks are known for much poorer yield values and groundwater quality at 100-1000 mS/m.
  - Rocks of the Gamtoos Group have slightly better groundwater yield and quality than the Bokkeveld Group shales and are similar to the Bokkeveld Group. Sandstones are inferior to the Table Mountain Group rocks.

- The Uitenhage Group rocks display low yield values (less than 0.5l/sec.) and very poor water quality values of 100-1000 mS/m.
- The Algoa Group rocks springs issuing from the basal Alexandria Formation conglomerate, occur sporadically along the coast.
- Groundwater can be obtained from the discontinuous basal Alexandria Formation conglomerate of the Algoa Group.
- Joint structures in subordinate sandstone lithozones, interbedded in largely incompetent Bokkeveld Group shales can be utilised for groundwater development.
- Numerous springs in the Table Mountain Group rocks issue due to presence of groundwater-impeding shale layers such as the shale of the Cedarberg Formation.
-
- The competent quartzitic sandstones of the Table Mountain Group contain numerous faults, other fractures and joints, which can be targeted for groundwater.
- Regardless of the groundwater exploitation potential of alluvium, it also often acts as a storage and recharge medium to underlying jointed hard rocks.
- Interbedded, often porous sandstone lenses in conglomerate and shale beds of the Uitenhage Group, do possess limited groundwater development potential.
- Grit, limestone, joint and fault structures in the Gamtoos Group can be aimed at for groundwater development.
- Overfolding and thrust faulting are common and often impede the movement and development of groundwater.
- Subordinate sandstone lithozones in anticlines, backed by favourable recharge conditions, can be used to obtain groundwater in the largely argillaceous beds of the Bokkeveld.
- Numerous smaller faults occurring in the Bokkeveld Group possess groundwater potential.
- Joints and fractures on crests of anticlines can be targeted for groundwater development.
- The Uitenhage Subterranean Government Water Control Area is essentially a two-layer, partially fractured aquifer in the eastern portion. The topmost, mostly non-artesian aquifer is formed by the predominantly argillaceous strata of the Uitenhage Group, which mostly acts as an aquiclude. The groundwater occurrence of this unit has been depicted on the map. The strata of the Uitenhage Group overlie the more productive, often artesian to subartesian Table Mountain quartzitic sandstone aquifer.
- No groundwater or at best insignificant groundwater can be obtained from the Coastal Sands in this area. Groundwater might however be procured from the underlying bedrock.

Figure 26 depicts the geohydrology within the proposed corridors and potential areas that should be further investigated.

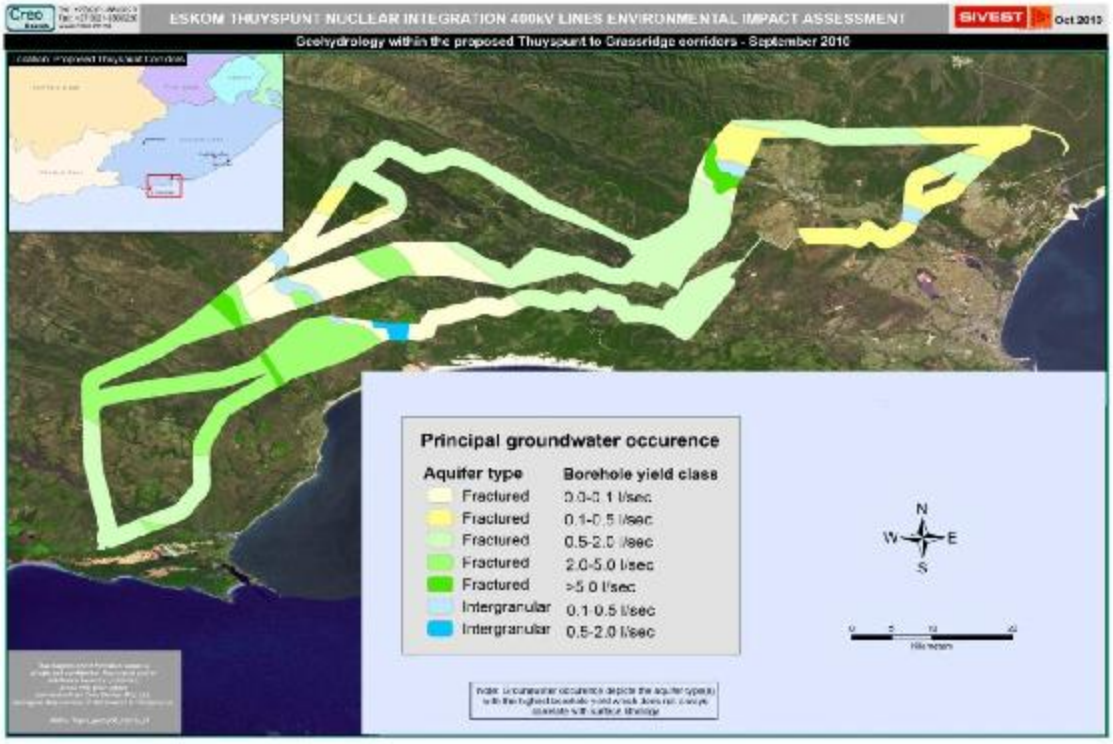


Figure 26: Geohydrology within the proposed corridors

- Land types and soil inventory

During the compilation of the land types and soil inventory, extensive use was made of the land type dataset. This dataset was compiled by the ARC-Institute for Soil, Climate and Water and contains the most comprehensive soil database for the whole of South Africa (Land Type Survey Staff 1972-2006).

Because the inventory was completed on a 1:250 000 scale, it outlines individual land types, rather than individual soil units. Land types are compiled by grouping similar soils together, taking into account soil characteristics such as soil horizons, permeability, degree of leaching, average depth, average clay percentage and other structural limitations that might be of interest to the user.

Terminology and classification was based on the official soil classification system for South Africa (Soil Classification Working Group 1977). The land type units are seen as areas with a fairly homogeneous character where similar management practices can be applied across the unit. Although a compilation of the soil types within a land type unit is present, the precise distribution thereof is not.

The 'Broad' attribute refers to a general description of the overall character of the soils present in the land type unit. Table 9 provides a list of the broad soil pattern codes, as well as accompanying descriptions.

Table 9: Broad soil pattern codes and descriptions

Broad soil pattern code	Description*
Ae	Freely drained, red, eutrophic, apedal soils comprise >40% of the land type (yellow soils comprise <10%)
Ah	Freely drained, red and yellow, eutrophic, apedal soils comprise >40% of the land type (red and yellow soils each comprise >10%)
Bb	Red and yellow, dystrophic/mesotrophic, apedal soils with plinthic subsoils (plinthic soils comprise >10% of land type, red soils comprise <33% of land type)
Ca	Land type qualifies as Ba-Bd, but >10% occupied by upland duplex/margalitic soils
Db	Duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; <50% of duplex soils have non-red B horizons
Fa	Shallow soils (Mispah & Glenrosa forms) predominate; little or no lime in landscape
Fc	Shallow soils (Mispah & Glenrosa forms) predominate; usually lime throughout much of landscape
Ha	Deep grey sands dominant (comprise >80% of land type)
Hb	Deep grey sands sub dominant (comprise >20% of land type)
Ia	Deep alluvial soils comprise >60% of land type
Ib	Rock outcrops comprise >60% of land type

* Please refer to the 'Glossary of Terms' for a comprehensive explanation.

Figure 27 illustrates the land types present in the proposed corridors earmarked for the construction of the ESKOM 400kV lines.

The Southern Corridor consists mostly of freely-drained, deeper soils (Ae, Ah, Bb, Ia) with a fair amount of sandier topsoils (Db) and deep grey sands (Ha, Hb). The depth of these soils range from just over 0.5 meter to well over 1m, with clay percentage varying from just over 4%, up to 22% in other sections.

In contrast with the above, the Northern and Eastern section of the corridors consist mostly of shallower soils (Fa, Fc), as well as large sections occupied by rock outcrops (Ib). Average depth of the soils in these regions rarely surpasses the 0.5m mark, with clay percentage from as low as 1% to over 22%.

The Western, South-Western limbs of the corridors are characterized by apedal topsoils with a low to medium base status, overlying plinthic subsoils. Plinthic subsoils refer to soil horizons where iron (and often manganese) oxides and hydroxides have accumulated in a zone of temporary wetness, e.g. fluctuation of water levels. These soils are relatively shallow, mostly between 0.25-0.5m, with highly variable clay percentage.

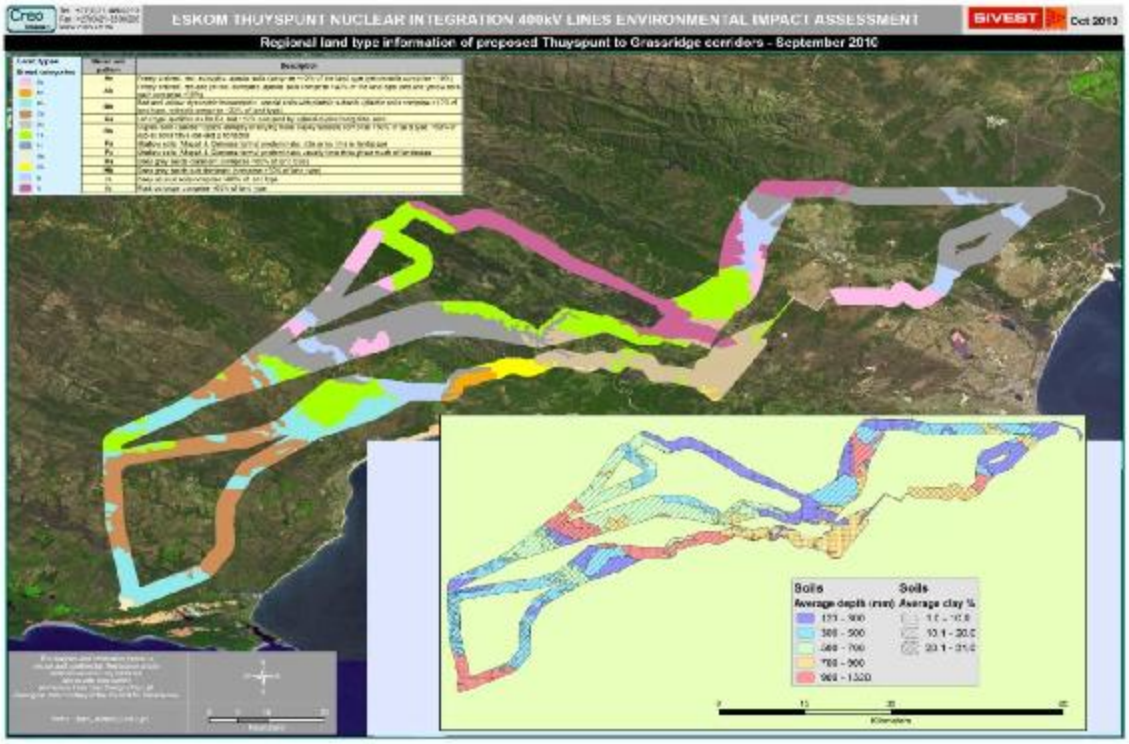


Figure 27: Land type information present in proposed corridors

- Digital Elevation Model and Slope

The Digital Elevation Model with 20m spatial resolution was used in the slope analysis study. The DEM was used to calculate slope (in percentage). To aid visualization and further processing, slope was reclassified into 3 broad classes *viz.* less than 10%, between 10 and 20%, and greater than 20%. These classes are broadly based on specifications for soil types where slope might be a restriction, and were obtained from the Conservation of Agricultural Resources Act (DOA 1984). Figure 28 illustrates the slope classes within the proposed corridors.

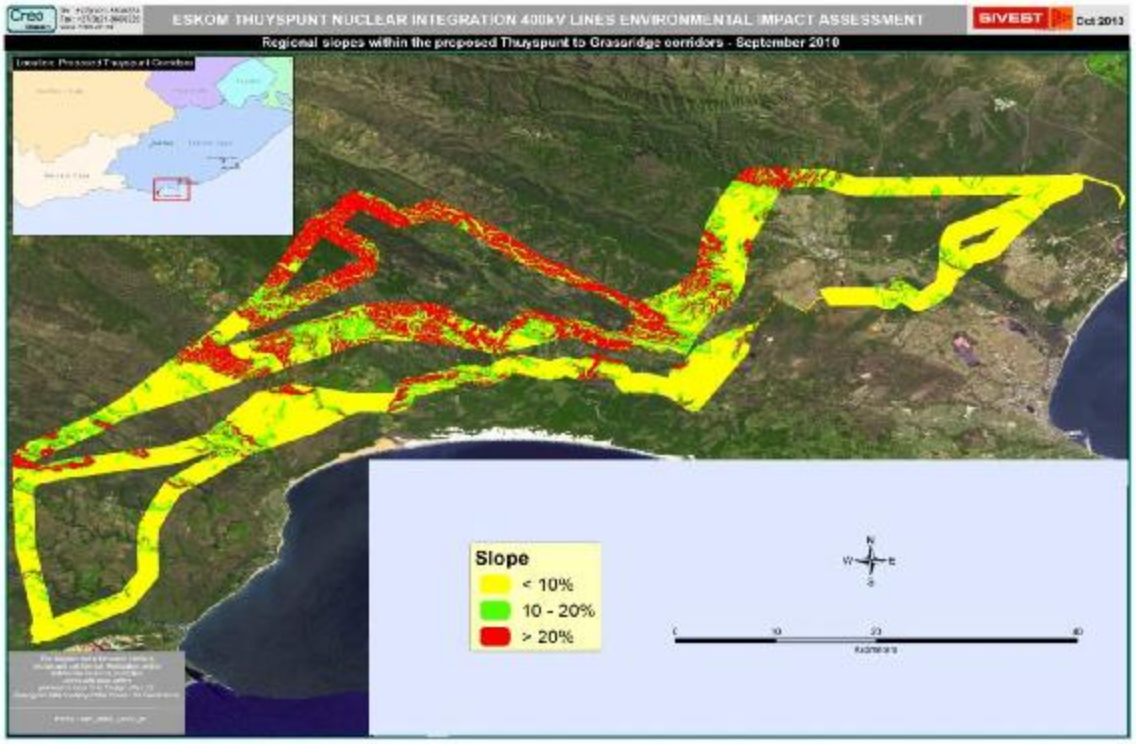


Figure 28: Slope classes in proposed corridors

- Potential Quarry Sites

Potential quarry sites were selected on the basis of suitable geology and are illustrated in Figure 29. The geology's suitability was subdivided into areas suitable for aggregate, concrete sand; plaster sand, road-building material, and unsuitable for any of the above.

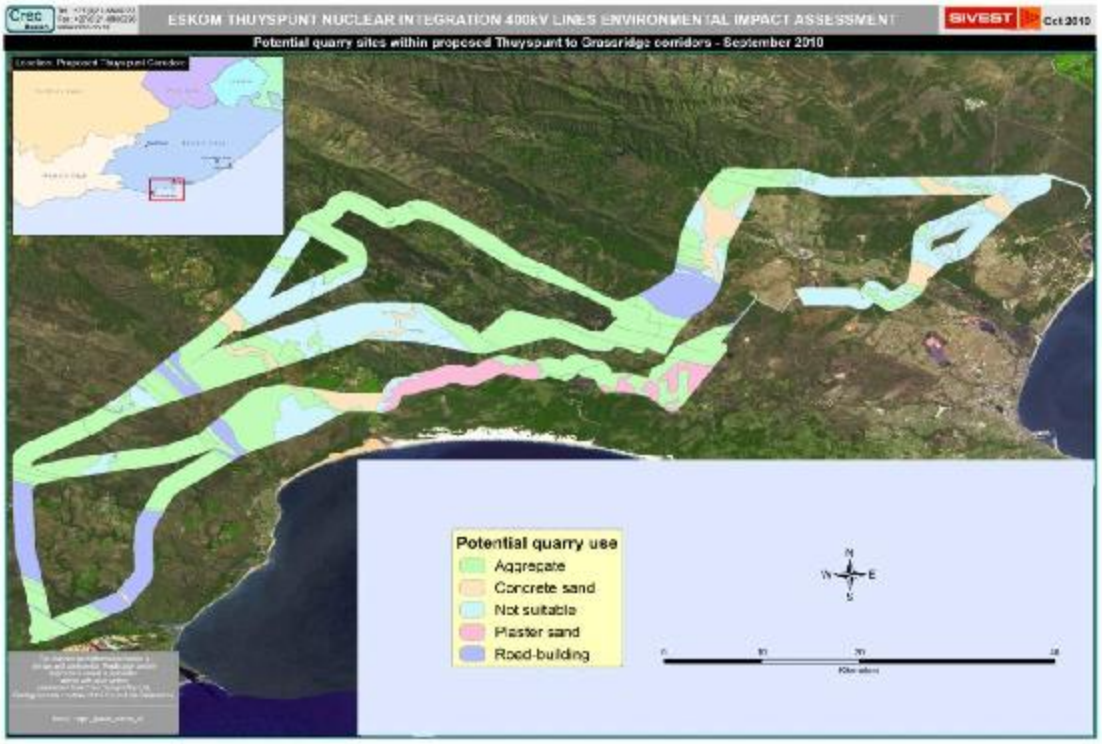


Figure 29: Potential quarry sites within the proposed corridors

7.5 Avifaunal Assessment

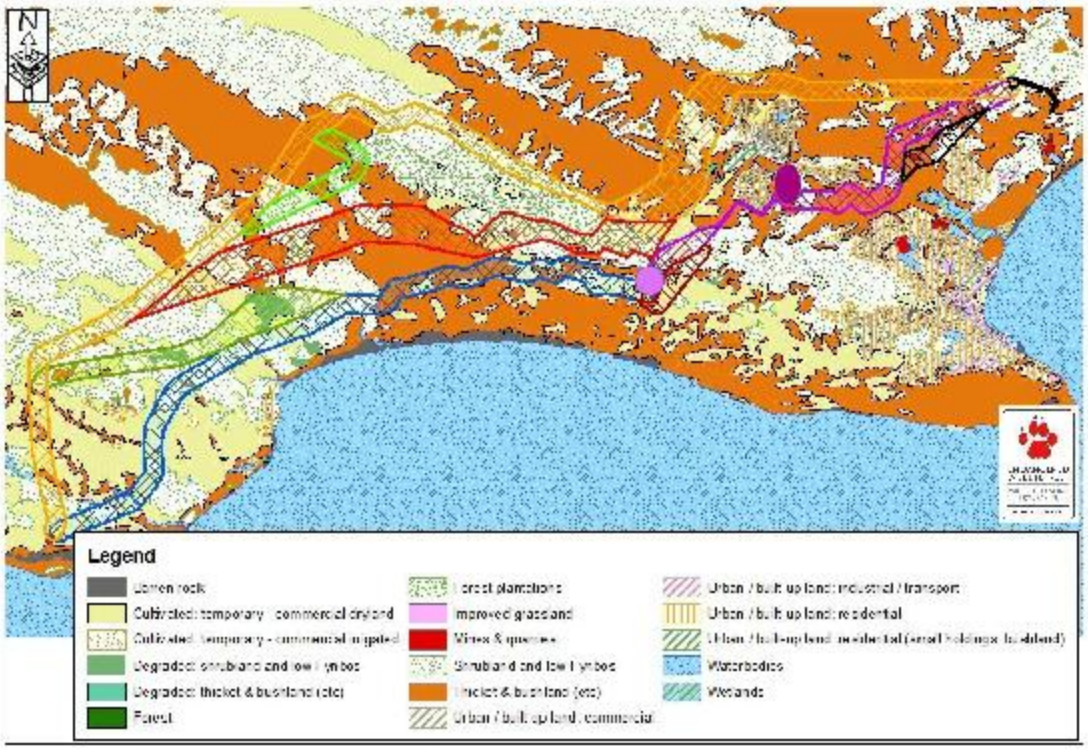
The Avifaunal study was conducted by Luke Strugnell of Endangered Wildlife Trust and a detailed report is provided in ***Appendix 4****.*

- Bird micro habitats

Although much of the distribution and abundance of bird species within the study area can be explained by vegetation type, it is necessary to look at the habitats available to birds to determine where the relevant species will most likely occur within the study area. These "micro habitats" do not always correspond to vegetation types and are determined by a combination of vegetation type, topography, land use, food sources and other factors.

Much of the fynbos in the study area, mostly in the west, has been transformed for agriculture and to promote livestock grazing, making the above vegetation classification less valuable than the discussion of existing microhabitats below. Whilst this obviously resulted in a loss of natural habitat, several species have adapted rather well to this transformation, these species include Blue Crane and White Stork. The wheat lands in the west have had a positive impact on Blue Crane numbers in the area.

Investigation of this study area revealed the bird micro habitats, which are described below. Species likely to make use of the various micro habitats can be seen in Table 10.



Map showing the land use found within the 5km corridor, taken from NLC2000 shape file

- Arable or cultivated lands:

Arable or cultivated land represents a significant feeding area for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources suddenly accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape.

In this study area arable lands are either pastures under irrigation, wheat fields under irrigation or 'improved grasslands' that are mowed for bailing. These lands attract certain species as shown in Table 1. In particular the White Stork has a high affinity with arable lands, with 86% of sightings in South Africa recorded on arable lands (Allan 1985, Allan 1989, Allan 1997 in Hockey, Dean & Ryan 2005). Blue Cranes and Bustards are also attracted to the 'short' grassland after it's mowed, as was evident during the site visit.

Figure 30: Arable or cultivated lands

- Wetland:

Wetlands are characterized by slow flowing water and tall emergent vegetation, and provide habitat for many water birds. The conservation status of many of the bird species that are dependent on wetlands reflects the critical status of wetlands nationally, with many having already been destroyed.

In this study area, several true wetland areas were observed, mostly being fairly small. Wetlands hold water for much of the year and may represent attractive areas for certain species year round – not only after rainfall. However, the top six collision species are not dependant on wetlands, although could utilize the wetland from time to time. Less obvious wetlands exist in the form of pans, and flat areas or plains as described below. These are extremely important to many of the top six collision species.

- Rivers:

Most rivers in southern Africa are in the east and extreme south, in the higher rainfall areas of the country. Various water associated bird species are mostly restricted to riverine habitat in southern Africa. The map distribution of these species correlates with the river courses in southern Africa.

There are several important rivers crossed at least once by the proposed power lines, they include the Gamtoos River and Krom River. The corridor also crosses smaller rivers that are dominated by thicket, suitable habitat for several Red Data species like the Half-collared Kingfisher, Knysna Woodpecker and Knysna Warbler.

- Flats or plains:

These areas are conspicuously flat and may hold surface water for longer after rainfall events. Drainage lines and river courses generally bisect the plains, and in some places these drainage lines have been dammed. Vegetation in these areas has either been transformed for cultivation or is mixed open fynbos/grassland areas. Species commonly found are most of the large terrestrial species such as Blue Cranes, bustards, and Korhaans.

Figure 31: Flats or plains

- Koppies or ridges:

Koppies or ridges are usually extremely rocky and comprise a relatively small proportion of this study area. Raptor species prefer to fly in the vicinity of the ridges as air currents are favourable, however these areas are not preferred habitat for most large terrestrial species sensitive to collision with the proposed power lines.

- Dams:

Many thousands of earthen and other dams exist in the southern African landscape. Whilst dams have altered flow patterns of streams and rivers, and affected many bird species detrimentally, a number of species have benefited from their construction. The construction of these dams has probably resulted in a range expansion for many water bird species that were formerly restricted to areas of higher rainfall. These include the pelicans, darters and cormorants. Many species from these families occur in this study area.

Even more importantly dams are used as roost sites by flocks of Blue Cranes, as well as other species like Spur-winged and Egyptian geese. This has serious implications for Blue Crane interaction with power lines, as they leave the roost in the early morning during low light conditions, and arrive at the roost in the late evening, again during low light conditions. During these conditions, the earth wires of power lines are almost invisible thereby increasing the chance of collision. As of 2004, a total of 32 separate collision incidents involving Blue Cranes had been reported to EWT from Eskom Distributions Southern Region (largely the Eastern Cape). A minimum of 72% of the Blue Cranes killed in these 32 incidents were found close to dams (Smallie 2004, unpublished report to Eskom Resources & Strategy). Dams are also used by storks and flamingos as foraging areas.

If construction takes place too close to dams and wetlands certain other Red Data species associated with them may be impacted on through disturbance and habitat destruction, they include the African Marsh Harrier, Black Harrier and the Greater-painted Snipe.

- Thicket

This vegetation type has been adequately described above. This vegetation type attracts Red Data species like Knysna Woodpecker and Knysna Warbler.

Figure 32: Thicket Vegetation

- Grassland

This area has small amounts of true grassland, but through the clearing of thicket and fynbos much of the Western area of the corridor is dominated by improved or pioneer grasslands that have opened up the habitat making it more favourable for Blue Crane and Bustard species.

Figure 33: Grassland Vegetation

- Bird Distribution per micro-habitat

Birds will, by virtue of their mobility, utilise almost any area in a landscape from time to time. However, the analysis in Table 10 represents each species most preferred or normal habitats. These locations are where most of the birds of that species will spend most of their time – and hence where impacts on those species will be most significant. The top six most sensitive collision vulnerable species (the most significant impact of the proposed power lines) have been shown in bold.

Table 10 makes use of the specialist's extensive experience, supported in the case of some species by data from the CAR project (Young, Harrison, Navarro, Anderson & Colahan, 2003).

Table 10: The 'micro-habitats' preferred by the Red Data species recorded (Harrison *et al*, 1997) in the quarter degree squares bisected by the corridors, and likely to occur in the study area, i.e. not offshore species.

Species	Cons. Status	Arable lands	Wetlands	Rivers	Flats or Plains	Koppies or ridges	Dams	Thicket/ Valley Bushveld	Grassland
White-backed Night-Heron	VU		X	X			X		
Cape Vulture	VU					X	X		
Martial Eagle	VU				X	X		X	
African Marsh-Harrier	VU		X		X		X		
Blue Crane	**VU**	**X**	**X**		**X**		**X**		**X**
Denham's Bustard	**VU**	**X**			**X**				**X**
Knysna Warbler	VU							X	
White-bellied Korhaan	**VU**				**X**				**X**
Greater Painted Snipe	NT		X	X			**X**		
Black Harrier	NT	X	X		X	X	X		X
Peregrine Falcon	NT	X	X		X	X	X		
Lanner Falcon	NT	X	X		X	X	X		
African Crowned Eagle	NT				X	X		X	
Black Stork	**NT**		**X**	**X**		**X**	**X**		
Yellow-billed Stork	NT	X	X	X			X		
Greater Flamingo	NT			X			X		
Lesser Flamingo	NT			X			X		
Secretarybird	**NT**				**X**				**X**
Great White Pelican	NT			X			X		
Chestnut-banded Plover	NT		X						
Black-winged Lapwing	NT				X				**X**
Half-collared Kingfisher	NT			X					
Knysna Woodpecker	NT							X	
Bush Blackcap	NT							X	

Species	Cons. Status	Arable lands	Wetlands	Rivers	Flats or Plains	Koppies or ridges	Dams	Thicket/ Valley Bushveld	Grassland
White Stork	Bonn	X	X		X		X		X

VU = Vulnerable; NT = near-threatened; Bonn = protected internationally under the 'Bonn Convention on Migratory Species'

- Relevant bird populations

Please refer to the specialist report for species-specific data relating to reporting rates for the Red Data species recorded in the 11 quarter degree squares covering the project area.

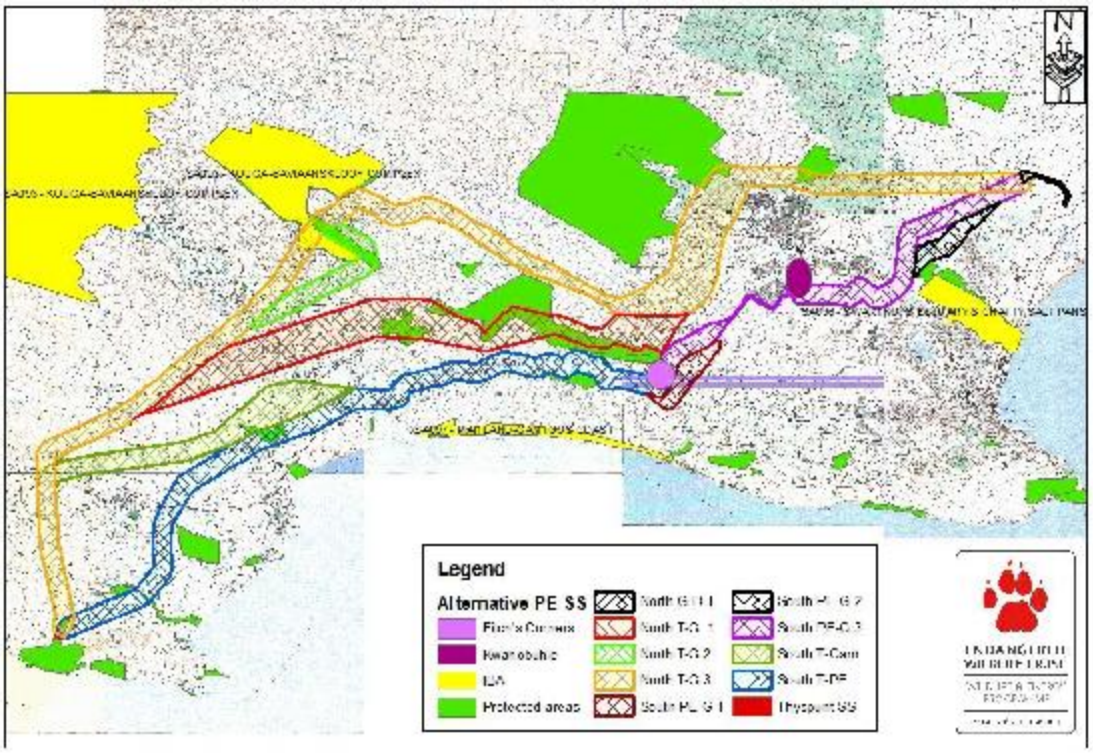


Figure 34: Location of the IBA's and protected areas

- IBA's

The SA093- Kouga-Baviaanskloof complex IBA is directly affected by the northern corridor. This IBA is important for the following reasons:

This IBA holds a remarkable number of avian habitats, making it home to approximately 300 bird species. The mountain ranges hold the Fynbos restricted species, the forest patches hold several forest restricted species and the Great Karoo plains hold several Namib-Karoo restricted species. Red list species include: Blue crane, Lesser Kestrel, African Marsh Harrier, Striped Flufftail, Stanley's Bustard, etc. For a full discussion on this IBA see Barnes, 1998 pg 208.

7.6 Surface Water Assessment

This Surface Water study was conducted by Paul da Cruz and Shaun Taylor of SiVEST and a detailed report is provided in Appendix 5.

- Wetland Occurrence along the Northern Corridor and alternative sections

    - Thyspunt HV Yard to Gamtoos Valley

The start of the Northern Corridor (north from the Thyspunt HV Yard) is characterised by slightly undulating terrain. The surface water features in this area chiefly comprise of depression wetlands along seep lines and man-made impoundments located in and amongst the agricultural fields of the broader landscape. To the north of the HV Yard the corridor crosses a wide valley bottom located to the north which is constrained by a low but prominent ridge to the south of the Krom River valley. This wetland is relatively wide and may be problematic for the spanning of the proposed transmission lines as described in more detail below. Significantly, the Northern Corridor crosses the Krom River, Geelhoutboom River and Seekoei River along this section. These river valleys are highly incised, and are unlikely to contain extensive wetland habitat within them, only having narrow channelled valley bottom wetland habitat that is dominated by palmiet (*Prionium serratum*). Ephemeral drainage lines occur on the side slopes of the valleys.

Where the Northern Corridor diverts to the north east, the topography reaches an altitude of approximately 400m.a.s.l as the corridor crosses the hills just to the north of Humansdorp. The corridor runs across incised terrain to the north-east of the town crossing a number of highly incised valleys in which ephemeral drainage lines run. The Rondebos and Diep Rivers that flow to the south-east are the major rivers in this area. These rivers are characterised by narrow valley bottoms with riparian vegetation and some wetland vegetation within them. Before reaching the edge of the Gamtoos River Valley the corridor traverses the upper catchment of the Kabeljous River over relatively flat terrain.

The western slopes of the Gamtoos Valley are very steep and the drop from the western plateau into the valley consisting of a series of deeply incised smaller valleys in which a dense network of ephemeral drainage lines are located.

Agricultural fields have completely transformed the valley; these line the banks either side of the Gamtoos which is likely to have historically (naturally) been a wide floodplain wetland.

    - Northern Corridor – Alternative 1

Please refer to the route description in the section above for the sections of the rest of the Northern Corridor which link to this alternative.

Alternative 1 of the Northern Corridor splits from Alternative 3 to the east of the Hankey Pass. This part of the alternative crosses the upper part of the Kabeljous River catchment over relatively flat

terrain. Just west of the lip of the Gamtoos Valley the corridor crosses a shallow valley in which the associated wetland area can be described as a channelled valley bottom system, a relatively uncommon wetland type in the context of the study area. The alternative then descends into rugged, hilly and steep terrain on the western slopes of the Gamtoos Valley before meeting the Gamtoos River. A number of deeply incised drainage lines feed into the Gamtoos valley bottom in this area. The section of the Gamtoos Valley crossed by the Corridor is relatively narrow. The Gamtoos meanders here with its outer bend slowly eroding away the steep western side of the valley. Over thousands of years, fertile alluvial material was deposited on the inner bend and this area is now intensively cultivated. This valley bottom area of the river is likely to have naturally been a floodplain wetland, being periodically flooded.

From this point, the valley bottom ascends into a hilly and mountainous area on the eastern slopes of the valley containing a high density of drainage lines. The corridor traverses similar terrain characterised by thicket vegetation east of the Gamtoos crossing a number of steeply incised drainage lines that drain southwards. East of the R331 road an elaborate drainage network exists in the upper catchment of the Geelhoutboom River. The alternative incorporates one of the largest impoundments in the study area, the Loerie Dam, which is fed by the steep-sided valleys of the Loeriespruit and the Berg River (draining from the east). Riverine forest exists along both river systems. East of the dam the corridor runs parallel to the deep Berg River valley with its similarly incised tributaries draining north from the Longmore Forest.

East of the Longmore Forest Station the alternative crosses a deep gorge at the head of the Berg River catchment. The terrain to the south is much flatter, but the presence of intensive cultivation is likely to have transformed any naturally-occurring wetlands in this area. Beyond this area, the terrain becomes more mountainous in the Longmore Forest region in which the corridor incorporates the peaks of the Van Stadens Mountains. Perennially-flowing rivers drain the afforested mountain slopes and the corridor runs parallel to a relatively wide valley which feeds into the Van Stadens River which has cut a deep valley through the mountains. The corridor crosses the valley between the two Van Stadens Dams. Rivers and streams characterised by riparian vegetation such as Cape Chestnut (*Calodendrum capense*) rather than classical wetlands exist in this part of the route. As it exits the Longmore Forest Area before re-joining Alternative 3, Alternative 1 crosses the upper parts of the Brak River catchment. The main river channel itself is highly invaded by alien vegetation.

- Northern Corridor – Alternative 2

Please refer to the route description in the section above for the sections of Alternative 3 and the rest of the Northern Corridor which link to this alternative.

Alternative 2 deviates from Alternative 3 a short distance from the Gamtoos River to the south east of Hankey. Being in close proximity to Alternative 3, Alternative 2 is similarly characterised by very hilly and mountainous terrain where hillslope seepages and ephemeral drainage lines enter into narrow valley bottom streams. The density of first order drainage lines in the part of the corridor which crosses the R330 east of Hankey here is intense. Drainage lines rather than wetlands therefore dominate the surface water features of this corridor.

The Klein River courses through the corridor, running through a very incised valley where extensive quarrying operations have degraded the area. The corridor then crosses highly mountainous terrain, crossing into the Otterford Forest area where plantations of exotic trees have been planted on the steep mountain slopes. The corridor crosses a series of first order stream valleys as it skirts the Stinkhoutberg Nature Reserve before rejoining with Alternative 3.

- Northern Corridor – Alternative 3

On the eastern side of the river near Hankey, the topography rises once again and becomes very hilly, mountainous and steep where ephemeral and seasonal drainage lines and hillslope seepages were identified and delineated. These eventually lead into the low-lying streams/rivers that course through the terrain. The corridor (Alternative 3) crosses the Klein River Valley (a tributary of the Gamtoos). Like the larger Gamtoos Valley, the Klein River valley bottom is completely transformed by agriculture. North-east of the Klein valley, the corridor crosses into the Stinkhoutberg Nature Reserve, a highly mountainous area of natural thicket vegetation and forest vegetation in the valleys. The steepness of the terrain precludes any wetlands except for hillslope seepage wetlands. From this point, Alternative 3 enters into the Otterford (Longmore) State Forest. This area is characterised by the occurrence of pine plantations on the slopes and the ridge tops, although a good effort has been made to clear exotic and alien vegetation in the valley lines, leaving the natural riparian vegetation to recolonise the riparian zones. Alternative 3 of the Northern Corridor then diverts to the south east bisecting the watershed between the Klein and Elands Rivers. The terrain through this section is highly mountainous and drainage lines rather than wetlands occur. The corridor runs across the upper part of the small Sand River catchment (a tributary of the Elands River to the north) through similarly mountainous terrain.

Running south-east of the Sand River catchment, the corridor runs parallel to the southern ridge of the Elands River Valley. This section of Alternative 3 crosses several streams and river systems, many of which are tertiary and lower order streams in the river valleys and higher order drainage on the incised slopes. The terrain here is slightly less rugged, although, many ephemeral drainage lines and a few hillslope seepages generally make up the surface water features along this part of the alternative. A relatively large man-made impoundment (Bulk River Dam) stretches across the corridor in the steep Bulk River Valley, the primary river into which most surface runoff in this section of the corridor drains. This part of the Alternative 3 follows along the boundary of, and partly crosses into the

Longmore Forest located to the south. South-east of the dam, the corridor narrows and runs along the north-facing slopes of the Elands River Valley. The first-order streams and springs at the base of this southern ridge of the valley are important from a water supply perspective as many of the farmsteads in this area derive their water supply from these features.

- The Elands River Valley to Dedisa Substation

The remaining section of the Northern Corridor turns to cross the Elands River Valley west of Rocklands and enters an area of incised (mostly natural) terrain characterised by thicket vegetation, The ephemeral drainage lines in rocky rugged terrain feed into the lower Elands River. The nature of the soils and terrain largely preclude the existence of wetlands.

The corridor crosses the Elands River at Mimosadale. The Elands River valley is highly infested with exotic trees, especially eucalyptus. These trees have replaced the natural riparian vegetation. To the north the terrain flattens out and allows the cultivation of crops. The Elands River is thus highly transformed by cultivation until its confluence with the Swartkops River at Kruisrivier. Similarly to the south, the more rugged terrain in the surrounding foothills is drained by ephemeral drainage lines.

The Swartkops River, as it exits the Groot-Winterhoekberg mountain range at the eastern end of the Groendal Wilderness, opens up into a wide valley. The valley has been highly degraded by sand mining activities which have been established to mine the fluvial material that is deposited as the valley changes to a wider profile. The river system was likely to have been a wide valley bottom or even floodplain system, but very little natural wetland or riparian habitat remains.

The corridor climbs once again into hilly ground in the north-west of the outskirts of Uitenhage. At this point, there are several drainage lines which cut into the steep and hilly landscape of the foothills of the Groot-Winterhoek mountain range. The terrain north of Uitenhage is similarly hilly, characterised mainly by natural thicket vegetation with ephemeral drainage lines.

East of the R75 road the terrain changes slightly to become more undulating with isolated koppies. Mid-way through this final section of the corridor, the Coega River cuts diagonally across the corridor. The banks of this river accommodate agricultural fields either side. This river has suffered greatly from the recent drought, not having flowed for a number of years. The river bed has also been highly invaded by alien invasive vegetation. The thicket vegetation continues to Grassridge. The narrow servitude between Grassridge and Dedisa crosses the Brak River. The incised nature of the river and the presence of calcrete which outcrops at the surface prevent the formation of hydric soils along this section of the corridor. . In general, very few surface water features appear along the final part of the alternative. From a desktop level, valley bottom wetlands, a few man-made impoundments and drainage lines generally characterise this section.

- Wetland Occurrence as it relates to Soils and Topography

    - Topography

Drainage typology is spatially differentiated across the area. A basic distinction can be made between wetlands (where they occur) and drainage lines or rivers. Classical palustrine-type wetlands (marshes, depressions and valley bottom wetlands) occur patchily across the area and only in certain locations. These areas typically share one joint topographical characteristic; they are typically areas of flat to undulating topography. This type of topography is conducive to the formation and development of wetlands, allowing water to move slowly, with the resultant deposition of sediment and occurrence of wetland vegetation which further inhibits the flow of water through these systems. These areas are scattered across the study area and include:

i. The area between the Thyspunt HV Yard and the Krom River
ii. The area to the north-east of Humansdorp
iii. The plateau to the west of the Gamtoos River Valley

Problematically for wetland protection, these 'flatter' parts of the study area are highly suitable for crop cultivation and it is expected that many wetlands have been significantly transformed by cultivation and drainage in the above areas and within the wide river valleys such as that of the Gamtoos. Wetland occurrence is not as simplistic as this however, and other factors such as sub-surface lithology can have a greater bearing on drainage typology. As an example, the relative scarcity of wetlands in the eastern part of the study area between Uitenhage and Grassridge is a good example. In this area the nature of the substrate is a limiting factor to wetland occurrence.

The occurrence of hydric soils is more widespread, and these can occur along drainage systems in mountainous areas, as explored in the in-field wetland assessment section below. Certain parts of the study area however have no wetland occurrence, for example in the hilly area east of the Gamtoos River valley. Steep topography and rocky substrate are a limitation to wetland development, and drainage typically occurs in the form of ephemeral drainage lines.

    - Soils and Land types

(Please also refer to the geotechnical section above)

The underlying predominant soils and land types as they occur across the Northern Corridor are displayed in the figures below.

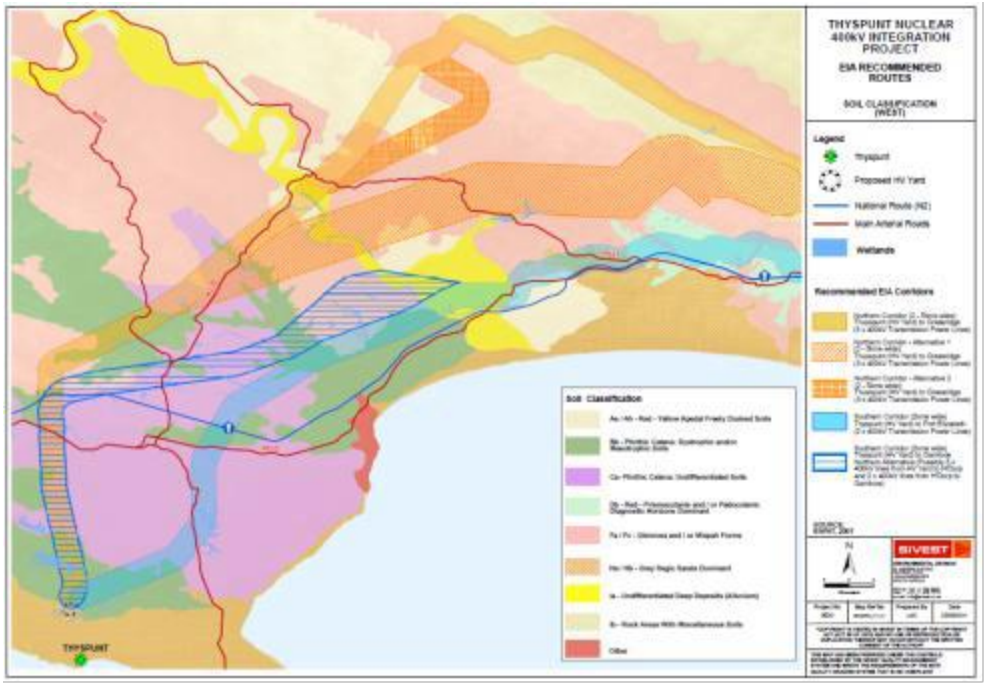


Figure 35: Predominant Soils and Land types in the western part of the study area

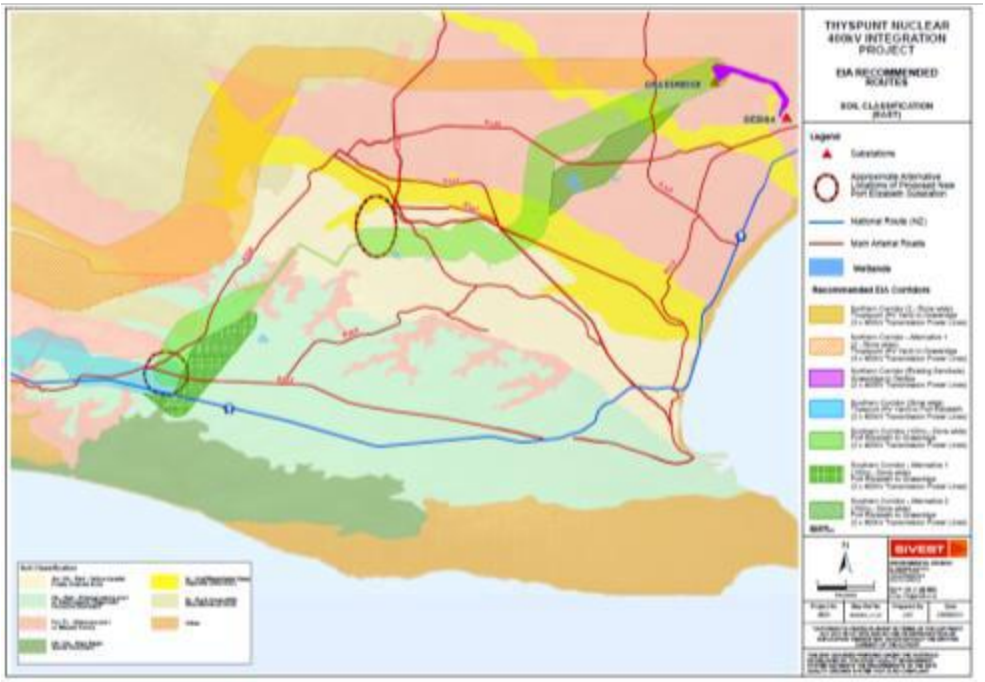


Figure 36: Soils and land types in the eastern part of the study area

The first part of the Corridor between the HV Yard and the Krom River Valley is characterised by dystrophic/mesotrophic, apedal soils with plinthic subsoils that are derived from Quartzitic sandstone or Shale and sandstone. These types of parent material act as a source for the overlying substrate which is predominantly characterised by a plinthic catena. Plinthic soils typically express accumulations of iron and manganese oxides under conditions of a fluctuating water table which gives rise to distinct reddish brown, yellowish brown and/or black mottles with or without hardening to form sesquioxide concretions (SCWG, 1991). The presence of dystrophic and mesotrophic characteristics

in the soils is important in a context of hydric soils; these soils have experienced marked leaching, i.e. the movement of water through the soil profile has caused the removal of soil material (often minerals) through solution (eluviation). Leached soils are typical grey in colour, as the minerals which give the soils their colour have been stripped out of the soil, leaving soil with a whitish / grey colour which is the colour of soil particles. Leached soils are often found in wetlands, with an "E" horizon (a soil horizon that has undergone significant leaching) being characteristic and indicative of soil saturation and thus hydric soils.

Additionally the presence of plinthic subsoils is very important from a wetland occurrence perspective. Many wetland soil types display plinthic characteristics. Plinthic soil horizons are often associated with the presence of perched water tables, and a 'hard plinthic' horizon at relatively shallow depth in the profile which is impermeable can result in the formation of hydric soils above it as the water in the soil cannot drain down into the profile, resulting in the overlying soils becoming waterlogged and saturated. The presence of plinthic characteristics on their own is often indicative of periodic saturation and development of anaerobic conditions associated with hydric soils.

The presence of this land type and its predominant soils would suggest that wetlands and hydric soils are relatively common in this part of the study area. This is borne out by the presence of a wide valley bottom wetland just to the south of the Krom River Valley which has been assessed in more detail in the main Surface water report.

Soils forming part of this broad land type (Bb) are found in other parts of the study area and along the Northern Corridor; the area to the north-east of Humansdorp in the upper catchment of the Rondebos River, as well as in the upper catchment of the Kabeljous River to the west of the Gamtoos River Valley. In the latter example a valley bottom wetland occurs in the relatively shallow valley of the upper part of the Kabeljous River where hydric soils were found to occur. This demonstrates that wetlands and hydric soils are relatively common in this land type.

The Ca land type is dominant in other western parts of the study area, including the area south-west and north-east of Humansdorp and west of the Gamtoos Valley in the vicinity of the R330 road to Hankey. This land type is similar to the Bb land type in that it is characterised by the presence of plinthic catenas, but is not characterised by the presence of leaching within the soil profiles. As explained above the presence of plinthic catenas is likely to be associated with hydric soils. This factor would seem to explain the relatively common occurrence of wetlands in the area to the north of Humansdorp in the Zwartenbosch area.

To the contrary, large parts of the Northern Corridor are underlain by dominant soil types which are not typically associated with wetland occurrence. The "Fa" and "Fc" land types are characterised by shallow soils in which the Mispah or Glenrosa soil forms predominate. The Mispah soil form consists of a topsoil horizon underlain by bedrock, whereas the Glenrosa soil horizon consists of top soil underlain by a lithocutanic B horizon that is derived from and which is very similar to the underlying bedrock. Neither of these soils are wetland soil forms, and thus wetlands (hydric soils) are unlikely to be common in these areas. Large areas within the corridor are underlain by Fa and Fc land types, as well as the Ib land type where outcropping rocks makes up >60% of the land type. These land types occur extensively east of the Gamtoos River (in the areas of hilly, rugged terrain), and the Longmore

Forest area is made up almost exclusively of these land types. The similarly rugged, hilly area along the Wincanton Road falls within the Fa land type and almost the entire length of the corridor east of Uitenhage (with the exception of the Coega River valley) falls within the Fc land type. The predominance of the Fc land type (along with the presence of calcrete that is present within the shallow lithology) in the area to the east of Uitenhage is an important factor in the relative scarcity of wetlands and hydric soils in this area. As indicated in the findings section below, the dominance of these soil forms in these parts of the study area does not necessarily completely preclude the existence of hydric soils and wetland habitat, but these are much less likely to be common.

Figure 37: Hilly incised terrain in the Wincanton area. The topography and lithology are not suited for the development of wetlands and ephemeral drainage lines exist in the valley bottoms

Lastly, the larger river valleys in the area are typically characterised by deep, undifferentiated alluvial deposits. Alluvium is not necessarily associated with hydromorphism in soils, as alluvial deposits are young and hydromorphism within the soils may not necessarily have formed. Under natural conditions the seasonal flooding of these river valleys by spate flow events within the river system is likely to have allowed the development of wetland habitat within the areas adjacent to the river channels. As explained above, extensive cultivation in these areas has almost completely transformed any naturally-occurring wetland habitat within these river systems.

7.7 Biodiversity Assessment

This biodiversity study was conducted by Liesl Koch of SiVEST and a detailed Biodiversity report is provided in ***Appendix 3.***

- Critical Biodiversity Areas

Please refer to Appendix B for the maps of the Critical Biodiversity Areas.

- Flora of the Study Area

Several vegetation types are present along the Northern Corridor and these are listed below. Three endangered vegetation types are present, namely Humansdorp Shale Renosterveld, Algoa Sandstone Fynbos and Albany Alluvial Vegetation. Two Vulnerable vegetation types are also present namely Tsitsikamma Sandstone Fynbos, and Cape Lowland Freshwater Wetland.

Table 11: Vegetation types in the Northern Corridor (Mucina & Rutherford, 2006)

Vegetation type	Protection level	Ecosystem Status
Albany Alluvial Vegetation	Poorly protected	Endangered
Albany Coastal Belt	Poorly protected	Least Threatened
Algoa Sandstone Fynbos	Poorly protected	Endangered
Cape Lowland Freshwater Wetlands	Poorly protected	Vulnerable
Coega Bontveld	Poorly protected	Least Threatened
Eastern Coastal Shale Band Vegetation	Poorly protected	Endangered
Eastern Inland Shale Band Vegetation	Well protected	Least Threatened
Gamtoos Thicket	Poorly protected	Least Threatened
Humansdorp Shale Renosterveld	Hardly protected	Endangered
Kouga Sandstone Fynbos	Well protected	Least Threatened
Kouga Sandstone Grassy Fynbos	Moderately protected	Least Threatened
Loerie Conglomerate Fynbos	Moderately protected	Least Threatened
Southern Afrotemperate Forest	Moderately protected	Least Threatened
Sundays Thicket	Poorly protected	Least Threatened
Tsitsikamma Sandstone Fynbos	Poorly protected	Vulnerable

The distribution of these vegetation types are illustrated in the figures below.

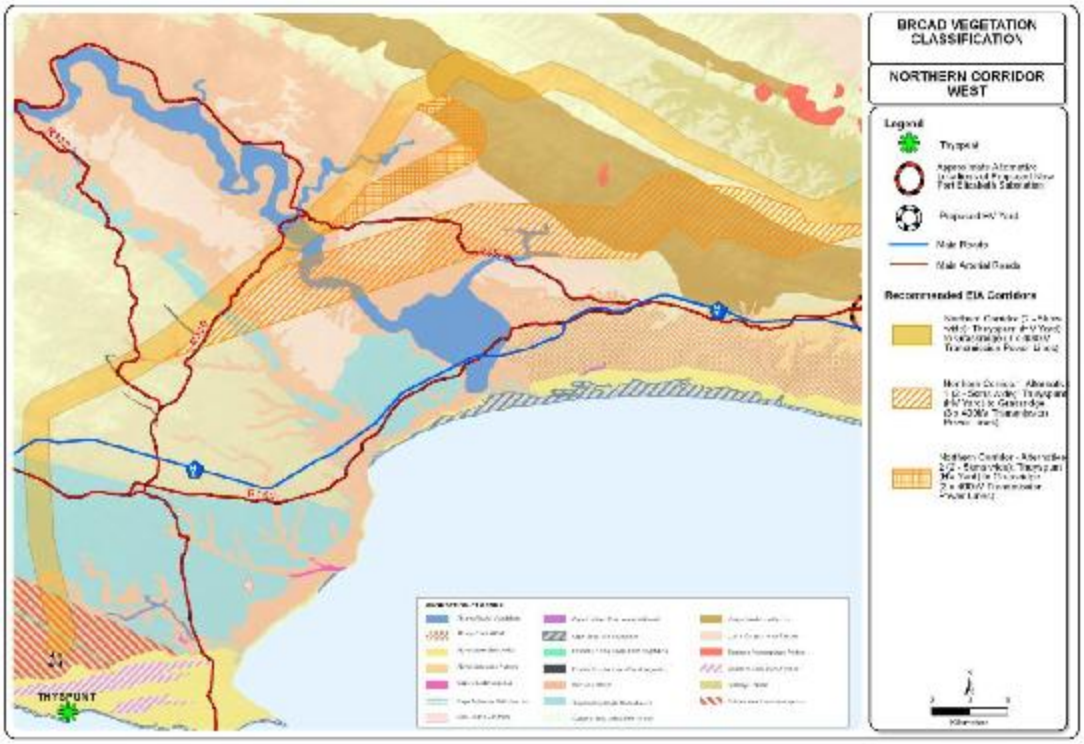


Figure 38: Vegetation of the Northern Corridor (West)

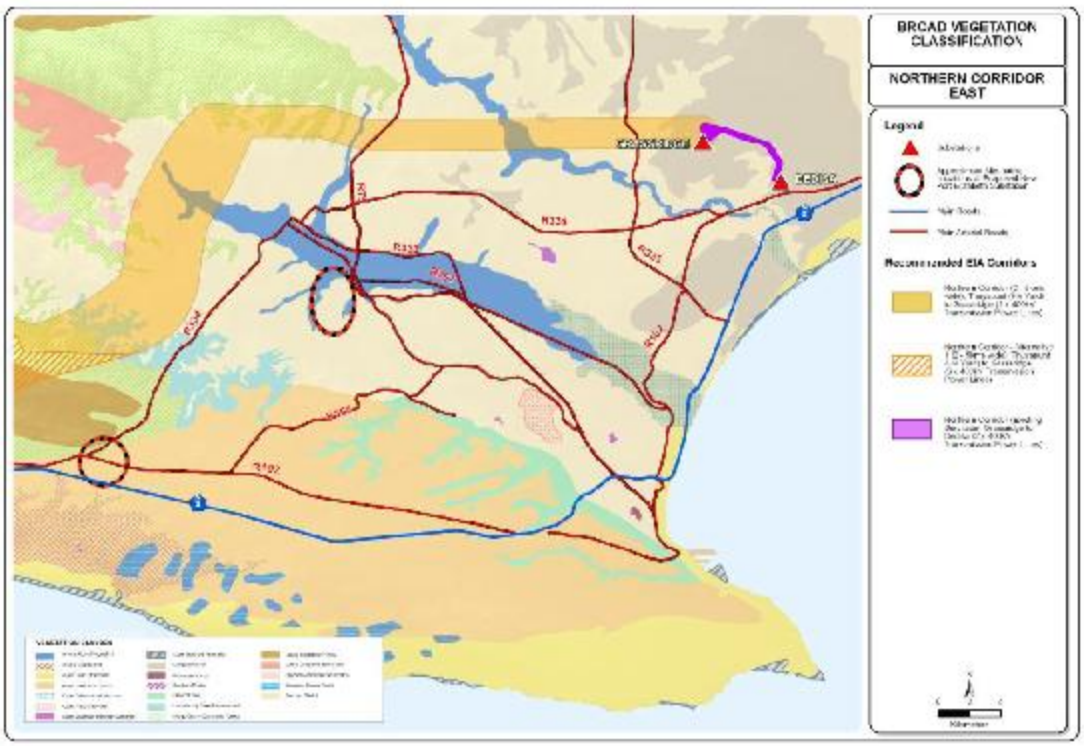


Figure 39: Vegetation of the Northern Corridor (East)

The above vegetation types are described in detail in the floral analysis for this EIA by Coastec (Appendix C of the main Biodiversity report (Appendix3)).

The information contained in the floral analysis report has been drawn on to assess each section of the corridor in the route assessment below.

- Fauna of the Study Area

According to the STEP study, the area covered by this study shows a high level of biodiversity (both faunal and floral) although endemism is not quite at the level shown by the flora in the area. Several faunal species are present in the area although it has become apparent that the majority of species are no longer present due to the increase in anthropogenic activities (Cowling *et al*, 2003). The study area potentially provides habitat for the following faunal species:

i. Mammals
ii. Amphibians
iii. Reptiles
iv. Invertebrates
v. Fish

- Mammals

Various mammal species are likely to occur within the study area. Appendix A of the main Biodiversity report (Appendix3) comprises a list of mammals that are likely to occur in Northern Corridor with the assigned level of threat facing a particular species. A map was used to correlate the occurrence of the Red Data species with their approximate occurrence within the various sections of the corridor. According to the spatial data, the majority of species within sections of the route are listed as species of least concern. However, within the Northern Corridor, the South African Red Data Book (Friedman & Daly, 2004) lists the Honey Badger (*Mellivora capensis*), the Lesser Long-fingered Bat (*Miniopterus fracterculus*), Schreiber's Long-fingered Bat (*Miniopterus shreibersii)*, Temminck's Hairy Bat (*Myotis tricolor*), the Cape Horseshoe Bat (*Rhinolophus capensis*) and Geoffrey's Horseshoe Bat (*Rhinolophus clivosus*) as Near Threatened. In addition, the Blue Duiker (*Philantomba monticola*) is classified as Vulnerable and the South-western black rhino (*Diceros bicornis bicornis*) which is Critically Endangered are also documented for the study area. The probability of these species occurring within the study area has been presented in a table in the main Biodiversity report (Appendix 3). The analysis indicates that the likelihood of the majority of Red Data species occurring within the study area is fairly low although the possibility still remains.

- Amphibians

In terms of species associated with the CFR, there are more than 40 species of amphibians present in this hotspot, sixteen of which are endemic. Amphibian species which are likely to be present within the study area are presented in the main Biodiversity report (Appendix 3). Three Red Data species have been recorded in the study area, namely the Cape Platanna (Endangered), Hewitt's Ghost Frog (Critically Endangered) and the Giant Bullfrog (Near Threatened). The probability of these species

being present within the study area remains high (refer to the main Biodiversity report in Appendix 3). The Hewitt's Ghost Frog is only located in the Elandsberge and is thus an extremely sensitive species. The frog species is known to occur within the Geelhoutboom River (*pers comm*., Werner Conradie Bayworld).

The area appears to the southern tip of the distribution of the Giant bullfrog (*Pyxicephalus adspersus).* The presence of this species is highly unlikely however all surface water features will be spanned and hence their habitat will not be affected.

Cape Sand Toad (*Vandijkophrynus cf. angusticeps*) & Arum Lily Frog (*Hyperolius cf. horstockii*) populations had been found in the past in the Humansdorp, Sand River and Cape St. Francis area (*pers comm*., Werner Conradie Bayworld). The closest population is in the Western Cape Province and these isolated populations may prove to be new species. Due to the small area of occupancy and the threat to the habitat these species will be highly sensitive to the proposed development. Surface water features must be spanned to avoid the habitat which is the preference of these species.

- Reptiles

With about 100 species (a quarter of which are endemic), reptile diversity in the CFR is considered to be relatively high. Several reptile species are present in the study area. The species which are likely to be present within the study area are presented in the main Biodiversity report in Appendix 3. The only Red Data species which is likely to be present is the Smith's Dwarf Chameleon which is listed as Critically Endangered. This species is unique to the Van Stadens Mountains and emphasis has been placed on the habitat that is available for this species. Habitat is present within the corridor for this species. Information has been supplement by the SARCA atlas although the majority of information from the SARCA atlas was not made available in time for the publishing of the biodiversity report.

Several reptile species which are listed in CITES Appendix II (Convention in the Trade of Endangered Species) are present within the study area. These species include the

i. Leopard tortoises (*Geochelone pardalis*),
ii. Angulate tortoise (*Chersina angulata*)
iii. Parrot- beaked tortoise (*Homopus areolatus*).
iv. Rock monitor (*Varanus albigularis*)
v. Water monitor (*Varanus niloticus*)
vi. Southern dwarf chameleon (*Bradypodion ventrale*)

Although these species have been placed on the CITES list due to the illegal pet trade.

- Invertebrates

Although little is known about the invertebrate fauna of the CFR, the few groups that have been studied suggest high levels of endemism. Of more than 230 species of butterflies, about 30 percent are endemic. Environmental Impact Studies rarely include detailed studies of invertebrates due to the vast number of species that are present. The construction of power lines is not likely to have an adverse effect on the invertebrate populations due to their mobility which allows them to move away. We have included species which would likely be present however no detailed assessments have been included. Mitigation measures suggested in the biodiversity report and EMP will ensure that impacts are reduced in terms of vegetation loss and clearing which would ultimately ensure that invertebrate populations are not adversely affected in the long term.

- Fish

The fish species which are likely to be present within the study area are presented in the main biodiversity report in Appendix 3. Three species are endemic to the Eastern Cape. Towers for the proposed transmission lines will more than likely span river systems and not impact on the stream flow. The proposed lines are thus not anticipated to affect fish species in the long term. Construction impacts can however result in impacts on river systems when access is required to the proposed servitude. Strict mitigation measures will need to put in place during this phase and access via roads rather than crossing rivers via informal crossings.

- Habitats

As mentioned previously, because faunal populations are dependent on the flora that supports them, assumptions regarding the presence of fauna can be made based on the flora present. Habitats within the study area are dominated by thicket vegetation with areas of Fynbos occurring. The study area falls within the Cape Floristic Region (CFR). The CFR is dominated by fynbos although several non fynbos vegetation types are present such as Renosterveld (Conservation International- www.biodiversityhotspots.org, 2009).

Also present in the study area are two prominent floodplains, namely Gamtoos River Floodplain and Swartkops River Floodplain. These rivers have been severely transformed by agricultural and industrial activities and are no longer pristine. They do however remain an important habitat for several species, especially amphibians, and should not be discounted. Several other river systems are also present some of which are important for Red Data species such as the Elands River.

Parts of the study area also contain lush coastal thicket which is often associated with dunes and has several faunal species associated with it.

A large portion of the study area is heavily transformed by anthropogenic activities which have resulted in a reduction in viable habitat. Despite the high level of transformation, the topography in the study area has resulted in the inadvertent conservation of vegetation and hence provides habitat for faunal species. Large areas of the study area are inaccessible for development and agricultural activities and this has thus contributed to the conservation of these areas. Areas such as the Van

Stadens River Gorge and Wild Flower Reserve and Lady's Slipper are examples of this. Further examples are discussed in detail in the route assessment below.

7.8 Visual Impact Assessment

This Visual Impact Assessment study was conducted by Paul da Cruz of SiVEST and a detailed report is provided in ***Appendix 8****.*

The Specialist Visual Report contains a summary of the scoping phase assessment of the physical landscape characteristics of study area and how these relate to the visual environment of the study area, as well as a summarised discussion of the Visual Absorption Capacity (VAC) and Visual Sensitivity of the study area. The specialist report should be consulted for this information. In addition, details pertaining to the visual baseline of the Elands River Valley as per the revised visual report are presented in the visual addendum (**Appendix 8**)

This section addresses the visual character of the receiving environment as per the specialist visual impact assessment. It should be noted that the latest corridors, the EIA Team-preferred alignment and the revised EIA Team-preferred alignment have been used for assessment.

- Sensitive Receptor Locations

For the purposes of this report, a sensitive receptor is defined as a receptor which would potentially be adversely impacted by the proposed power lines. This takes into account a subjective factor on behalf of the viewer – i.e. whether the viewer would consider the impact as a negative impact. The adverse impact is often associated with the alteration of the visual character of the area in terms of the intrusion of power lines into a 'view', which is perceived to affect the 'sense of place'. Thus receptors of visual impacts in areas / landscapes where the current visual character of the environment is part of the appeal of an area and thus has a socio-economic or cultural importance are more likely to be considered as sensitive receptors. As such a distinction must be made between receptor locations and sensitive receptor locations – receptor locations may be able to view the proposed power lines and substations, but would not necessarily be adversely affected by any visual intrusion associated with the power lines

The Table 13 below lists a number of the sensitive receptors that have been identified throughout the EIA phase, that were potentially visually affected by the proposed power lines. In order to ensure that all sensitive receptor locations along all of the corridor 'versions' have been captured, the Northern Corridors were assimilated into one combined shapefile, and receptor locations within this combined corridor area were identified. As potential visual impacts would be potentially experienced in the immediate area outside of the corridors, receptors within a 2km buffer outside of the boundary of the corridors have also been included. 2km has been chosen as beyond this distance it has been assumed that the visual impact associated with the power lines would greatly diminish (even if the power lines were located on the boundary of the corridor). As parts of the Northern Corridor have fallen away since the start of the EIA, certain receptor locations are no longer likely to be affected at

all. In order to allow the distinction to be made between receptor locations that are still likely to be affected and those that are not, the table lists the position of the receptor in relation to both the corridor at the start of the EIA phase. The table has been colour coded for ease of reference:

Table 12: Position within the Corridor

Position within the Corridor:
Within Corridor
Within 2km buffer
Outside 2km buffer

It should be noted that one of the Northern Corridor alternatives (at the start of the EIA phase), Alternative 1 (the southern Longmore alternative) now forms part of the Southern Corridor. In order to lessen confusion, *it should be noted that the receptor locations potentially affected by this part of the corridor are not included in this report, but in the southern corridor report*.

Table 13: Sensitive Receptor Locations

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Penny Sands	Farmstead	Outside of corridor at start of EIA phase	Within Revised EIA Corridor
Lappie-aarde	Farmstead	Outside of corridor at start of EIA phase	Within 2km buffer
Geelhoutboom Farmstead West	Farmstead and Game Farm	Within corridor at start of EIA phase	Within Revised EIA Corridor
Geelhoutboom Farmstead East	Farmstead and Game Farm	Within corridor at start of EIA phase	Within Revised EIA Corridor
Die Berg	Community	Just outside corridor at start of EIA phase	Within Revised EIA Corridor
Zwartenbosch Golf Estate	Golf Course and proposed housing estate	Outside of corridor at start of EIA phase	Within 2km buffer
Rondebosch Farmstead	Farmstead	Outside of corridor at start of EIA phase	Within 2km buffer
Rondebosch Restaurant and Tenant's House	Restaurant and Homestead	Outside of corridor at start of EIA phase	Within 2km buffer
Honeyville	Homestead	Just outside corridor at start of EIA phase	Outside of 2km buffer
Honeyville Private Nature Reserve and proposed re-burial (Heritage) site	Protected Area and Heritage Site	Part of Nature Reserve = within corridor at start of EIA phase Heritage site = within corridor at start of EIA phase	Nature Reserve = partly within 2km buffer and partly outside 2km buffer; Heritage site = within 2km buffer
Honeyville Proposed Cultural Centre	Proposed cultural centre	Within corridor at start of EIA phase	Within 2km buffer
Honeyville Proposed Ecc-village	Housing	Just outside corridor at start of EIA phase	Outside of 2km buffer
Weltevrede	Farmstead	Just outside corridor at start of EIA phase	Outside 2km buffer
Chan Te Mar Hunting Game	Owner (guest accommodation) Residence	Within corridor at start of EIA phase	Outside 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Farm			
Chan Te Mar Hunting Game Farm	Guest Accommodation near biltong making building	Within corridor at start of EIA phase	Outside 2km buffer
Chan Te Mar Hunting Game Farm	Manager's Residence	Within corridor at start of EIA phase	Outside 2km buffer
Antonieskraal	Farmstead	Outside of corridor at start of EIA phase	Within Revised EIA Corridor
Sarah Baartman Monument and Sundial	Monument (Heritage Site) and Proposed Cultural Centre	Just outside corridor at start of EIA phase	Outside of 2km buffer
Putters Inn B&B	Accommodation Facility	Just outside corridor at start of EIA phase	Outside of 2km buffer
Heuningkloof Farmstead	Farmstead	Outside of corridor at start of EIA phase	Outside of 2km buffer
Loerie Ruskamp – Main Building	Pub and camping	Within corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp – Accommodation – Old Saal	Accommodation Facilities	Within corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp – Accommodation – Rondawels	Accommodation Facilities	Within corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp – Accommodation – Klein Skool	Accommodation Facilities	Outside of corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp – Accommodation – Moreson Farmhouse	Accommodation Facilities	Outside of corridor at start of EIA phase	Within 2km buffer
R331 Road stall / Farm stall	Road stall / Farm stall (Currently closed)	Outside corridor at start of EIA phase	Within 2km buffer
Sand River Lodge	Accommodation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Owners House (Sand River Lodge)	Homestead	Just outside corridor at start of EIA phase	Within 2km buffer
Tanglewood	Homestead	Just outside corridor at start of EIA phase	Within 2km buffer
Burrows Hiking and Bush Camp	Accommodation Facility and Leisure Facilities	Within corridor at start of EIA phase	Within 2km buffer
Vrede	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Gumdale	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
La Rochelle	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Old House – Bulk River Dam		Just within corridor at start of EIA phase	Within 2km buffer
Peerboom	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Hillingdon	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Solitude (Owner's Residence and Guest house)	Homestead (owners) & Accommodation Facility	Just outside corridor at start of EIA phase	Within 2km buffer
Offcamber Bush Camp	Accommodation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Waverley Hills	Homestead and Accommodation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Uitkyk and Brakkefontein Farmsteads	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
Ranger Hills	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
The Chalet Farmstead – North	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
The Chalet Farmstead – South	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
High Ridge Farmstead	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Holrivier Farmstead West	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Holrivier Farmstead East	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Ampé ni Farmstead North	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Ampé ni Farmstead South	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Various Homesteads / Farmsteads along the Elands River Road west of Rocklands	Homesteads / Farmsteads	Outside corridor at start of EIA phase	Outside 2km buffer
Paardehoek Farmstead West	Homestead / Farmstead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Paardehoek Farmstead East	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km Buffer
Mimosadale West / Ruigte Vlei Game Farm (incl. Echodale)	Game Farm (Hunting), owner's Homestead and Proposed Hunting Accommodation (Echodale old farmstead)	Within corridor at start of EIA phase	Within 2km buffer
Echodale - owner's house	Farmstead	Within corridor at start of EIA phase	Within 2km buffer
Echodale - old farmhouse (proposed accommodation)	Proposed Hunting Accommodation	Within corridor at start of EIA phase	Within 2km buffer
Wincanton Old Farmstead (proposed accommodation	Proposed Hunting Accommodation	Within corridor at start of EIA phase	Within Revised EIA Corridor

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Wincanton Old House (proposed accommodation)	Proposed Hunting Accommodation	Within corridor at start of EIA phase	Within Revised EIA Corridor
Blouberg Farmstead	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Sonneheuwels	Homestead	Just outside corridor at start of EIA phase	Within 2km buffer
Plumbago Hills	Conference Venue and Homestead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Buffelsfontein Farmstead	Farmstead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Rooiland Farmstead	Farmstead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Groendal – Offices and start of trails	Nature Conservation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Groendal – Hiking trails	Wilderness area / hiking trails	Outside corridor at start of EIA phase	Within 2km buffer
Northern parts of Uitenhage (Varnes Estate & Levydale)	High income suburban area	Outside corridor at start of EIA phase	Within 2km buffer
Uitenhage Concentration Camp Monument and facility	Historical Monument and Cultural Facility	Within corridor at start of EIA phase	Within Revised EIA Corridor
Springs Municipal Resort	Pleasure Resort	Outside corridor at start of EIA phase	Within 2km buffer
Springs Nature Reserve	Hiking trails in Municipal Nature Reserve	Outside corridor at start of EIA phase	Outside 2km buffer
Doornkom Safaris	Hunting Farm and owner's residence	Outside corridor at start of EIA phase	Outside 2km buffer
Hexagon	Wedding Venue and B&B	Within corridor at start of EIA phase	Within 2km buffer
Amanzi Estate (proposed golf estate development)	Proposed Golf Estate and Residential Development	Within corridor at start of EIA phase	Within 2km buffer
Coega Ridge (Proposed Eco Estate)	Proposed Lodge	Within corridor at start of EIA phase	Within 2km buffer
Coega Ridge (Proposed Eco Estate)	Proposed Eco (residential) Estate – middle income housing and golf estate	Outside corridor at start of EIA phase	Within and outside of 2km buffer

Maps of all of these Receptor locations have been generated and are presented in the specialist study.

- Visual Sensitive Receptors in the Elands River Valley

The low density of human habitation within the Valley entails that individual receptor locations can be pinpointed. It should be noted that due to the visual sensitivity of the valley discussed in section 2.2 of the Visual addendum (**Appendix 8**), all farmsteads, as well as tourism facilities have been classified as sensitive receptor locations. Accesses, in particular public access roads can also be termed as receptor locations.

In terms of the most recent proposed alignments of the Northern Corridor lines, a certain section of the valley would be potentially be able to view the proposed power lines. Due to a distance factor that entails that locations beyond a certain radius of the lines would be unlikely to distinguish the lines from the background not all parts of the valley would be exposed to views of the proposed power lines. For the purposes of this report, the area of focus within the wider Valley stretches from the farm Elandsfontein (i.e. Wistaria and Oaklands) in the west to the farms Solitude and Boschfontein in the east (i.e. Waverly Hills). Visual receptor locations identified within this area are presented in Table 1 of the main Visual Addendum (**Appendix 8**).

- Sensitive Receptor Roads

A number of sensitive receptor roads and one railway) are present within the study area. Visually-sensitive receptor roads were identified in the scoping phase of the project, and these have been refined based on the revised EIA Southern Corridor. These roads are typically located within areas of high scenic beauty, or along tourist routes which would be accessed in many cases as a way to appreciate the natural beauty of the area, or to access tourist facilities. Experiencing views of power lines may be associated with a visual impact, as the power lines may be perceived to be incongruous in this setting.

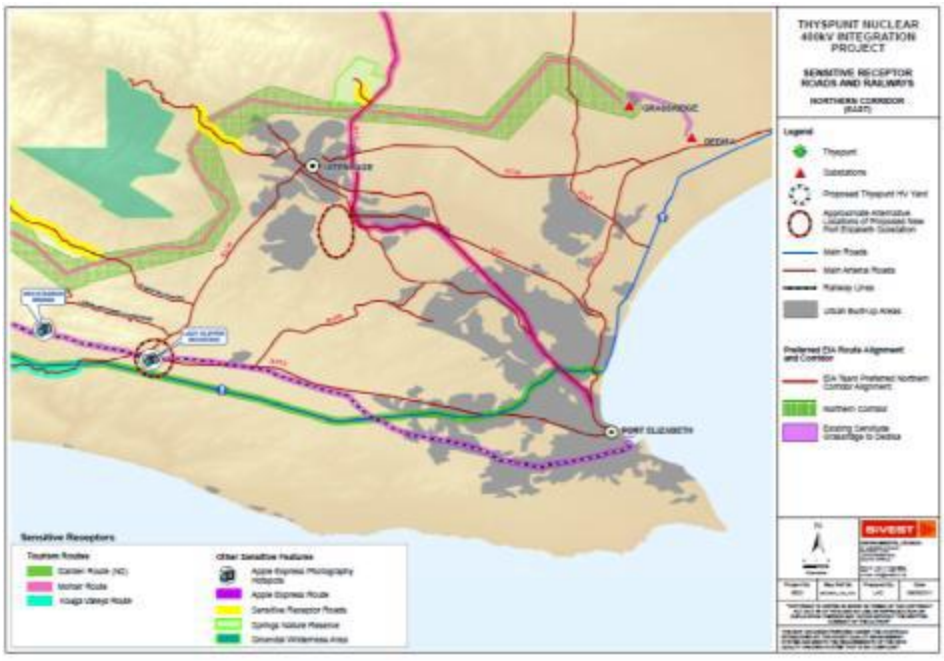


Figure 40: Eastern section of the study area showing sensitive receptor roads in relation to the Northern Corridor

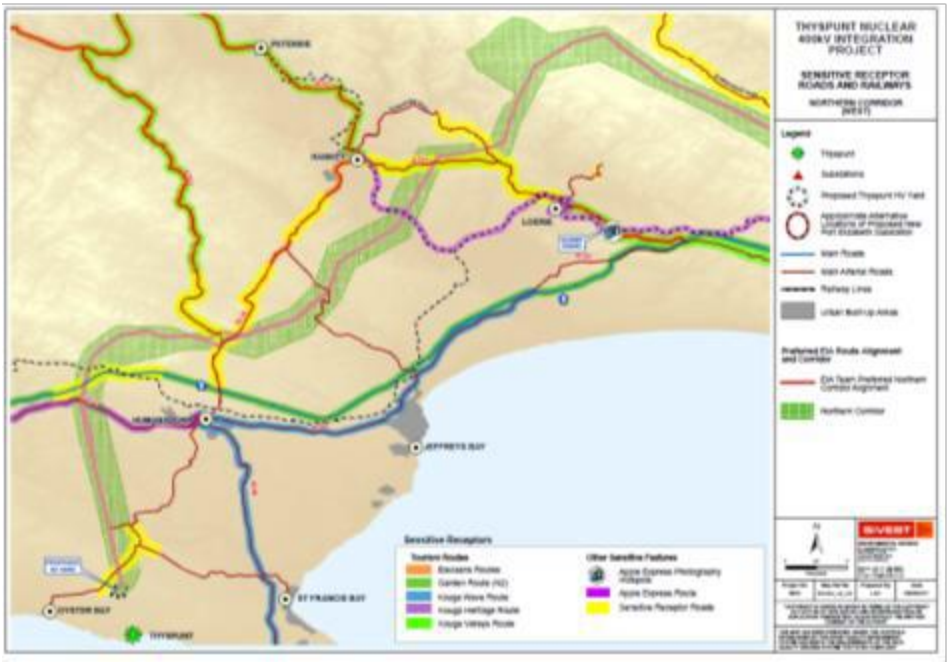


Figure 41: Western section of the study area showing sensitive receptor roads in relation to the Northern Corridor

The following roads have been identified as carrying receptors that may potentially be sensitive to visual impacts:

Table 14: Sensitive receptor roads

Road Stretch	Visual Sensitivity
The St. Francis Bay-Oyster Bay un-surfaced road	-Main access to the town of Oyster Bay (tourism location); passes through a largely unspoilt natural area close to the dune fields
N2 highway north and north-west of Humansdorp	-Arterial road carrying much tourist local access traffic and traffic to and from the Garden Route -Passes close to the scenic range of hills to the north and north-west of Humansdorp
R330 north of Humansdorp	-Forms part of a local tourist route -To the north of Humansdorp passes through a highly scenic, natural area consisting of natural grassy fynbos and hills
R332 (un-surfaced road) north of Humansdorp	-Forms part of a local tourist route -Passes through a highly scenic, natural area consisting of hilly terrain -Access route to planned tourism and heritage sites in the Honeyville area
R330 Hankey Pass	-Forms part of a local tourist route -To the north of Humansdorp passes through a highly scenic, natural area
R331 between Hankey and Loerie	-Local tourist route – part of the access to the Baviaanskloof and to the Sara Baartman Monument -Highly scenic road that follows high ground in hilly, natural terrain with highly scenic vistas of the surrounding areas
Loerie Ruskamp and Klein Rivier access road	-access road to the Loerie Ruskamp (tourism attraction) -highly scenic road with vistas to the natural hilly terrain and the distant coast to the south
Elands Valley Road (un-surfaced)	-Local access to a number of tourism facilities within the Elands River Valley -Parts of the road (especially further west) are highly scenic with clear vistas to the natural ridge to the south and over the valley and the distant Groendal Wilderness Area to the north
Local access road to the Groendal Wilderness Area Offices	-access road to the Groendal Wilderness area (tourism attraction) -the road runs into a highly scenic area of natural hilly terrain
Local access road to the Springs Nature Reserve	- access road to a tourist attraction
The Apple Express Railway	-The Apple Express is a tourist attraction, part of which is based on the scenery it passes through -Passes through a number of very scenic areas including the Red Cliffs of the Gamtoos valley

The maps above indicate these receptor roads and the route of the Apple Express. The potential impact of the proposed Northern Corridor power lines on these roads and railways is assessed in the impact assessment section below.

7.9 Social Impact Assessment

This Social study was conducted by Nonka Byker of MasterQ and a detailed report is provided in ***Appendix 11****.*

- Geographical Processes

The Cacadu District Municipality (CDM) is characterised by what is named in the municipality's IDP, a 'web' of settlements of various sizes across an area of approximately 60 000km^2. Most of these settlements are located on average about 250km from Port Elizabeth, which in turn impacts on the service delivery in these remote areas as most of the suppliers are said to reside in the Port Elizabeth area.

- Settlement Patterns

The Kouga Local Municipality (KLM) is made up of various nodes and urban areas, of which Humansdorp is said to act as the regional service centre, offering commodities and services to the surrounding agricultural and coastal communities. The most important tourist destinations in the area include the coastal towns of Jeffrey's Bay, St. Francis Bay, Cape St. Francis and Oyster Bay. Other urban areas such as Hankey and Patensie also provide important services to the surrounding high density agricultural industry. Although the settlement patterns of these towns differ from town to town, most of them are characterised by the former separate development policies according to the then Group Areas Act. A result of such segregation is a lack of social integration within areas, coupled with high costs in terms of infrastructure and service delivery to such areas.

The ECDMA10 (Eastern Cape District Management Area) which forms a small part of the study area is dominated by scattered farm dwellings. The largest urban settlement within the DMA is Rietbron, with a total of 439 households (CDM IDP 2007-2012). Apart from Rietbron, most of the settlements in the DMA are railway stations, which was historically also the catalyst for economic growth in the area when rail was still the preferred mode of transport.

- Agriculture

The agricultural sector within the CDM is mostly characterised by privately owned commercial farms ranging from sheep farming in the semi-Karoo to cultivation and dairy farming in the southern coastal belt. The Sunday's River Valley in turn is mostly characterised by citrus farming.

In the KLM, the strong citrus and chokka industries are viewed as the major drivers in terms of agricultural output, which in turn contributes heavily to the overall KLM economy, both in terms of its economic value as well as job creation. However, according to the KLM IDP, agriculture's commercial primary production has reached its capacity, which is further compounded by the fact that the overall agricultural output of the Eastern Cape Province (ECP) as a whole has also slowed down over the past five years. It is believed that the current state of affairs will affect the expansion potential of the citrus industry, which could be exacerbated even further by an irrigation scheme that is at full capacity and other challenges relating to land access.

The Department of Agriculture has identified the areas outside the urban edge within the NMBM as prime agricultural land. As such, the NMBMM IDP states that these areas should be protected for extensive agricultural use and that other services, such as health, education and retail, should also be provided in this area.

- Mining

Minimal mining activities take place within the CDM and where it does, it is mainly excavation for construction material. River sand mining takes place in both the Sunday's River Valley as well as in the KLM. Currently studies are underway to determine the feasibility of limestone mining in the Makana area, as well as for uranium mining in the Camdeboo area. However, one of the main obstacles is a lack of adequate infrastructure services, including water provision and the conditions of the roads within the CDM.

- Development Trends

The CDM is mostly characterised by scattered settlements with low population growth. Apart from the agricultural and tourism industries, there is limited economic stimulus within the CDM. Therefore the CDM is shaped into areas of specific functionality, as per Figure 42 below.

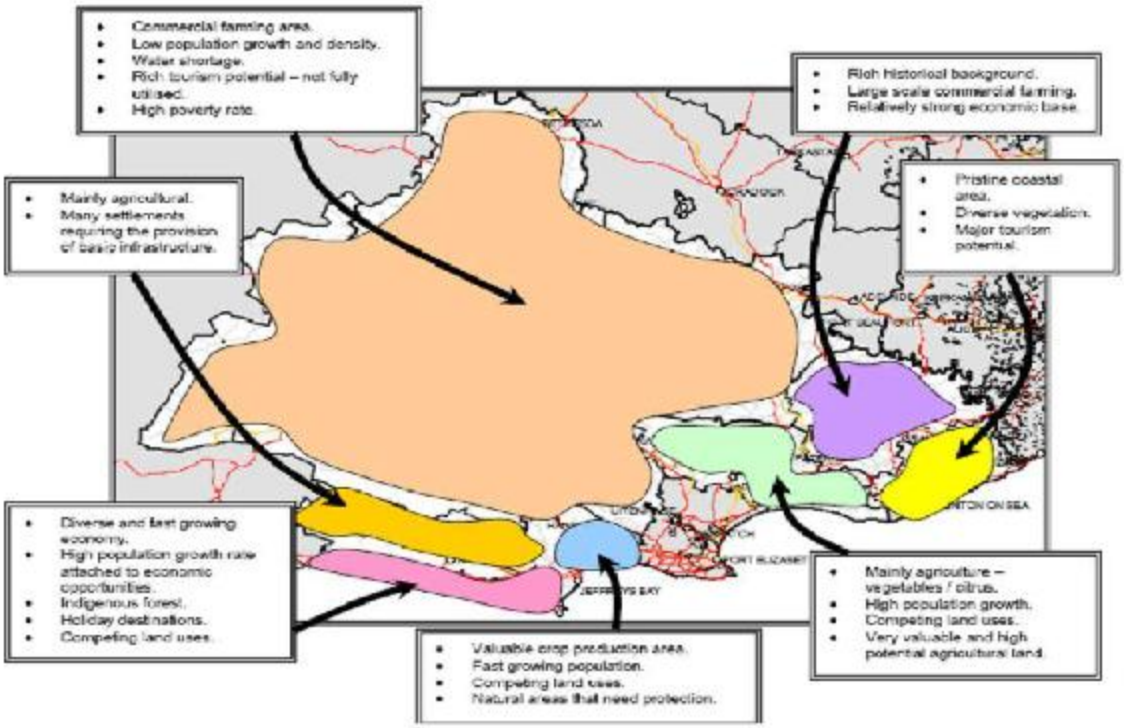


Figure 42: Areas of functionality within the CDM: Source: CDM SDF 2007

Implications for the proposed development:

- To ensure the health and safety of people in the area, the placement of the transmission power lines should avoid human settlement;
- To allow for future development plans, it is preferable that the route alignment of the transmission power lines take cognisance of such plans to avoid interfering with such plans as far as possible;
- The most preferred alignment is an alignment that passes over grazing land as animals can still freely move around towers and underneath the transmission power lines, which implies minimal land loss;
- Where the transmission power lines cannot avoid crossing over cultivated land, it is preferable that the alignment follows farm boundaries as far as possible to minimise the potential impact of land loss.

- Demographical Processes

Demographic processes relate to the number of people and composition of a community and include an overview of the population size and the educational profile of the affected communities.

- Population

The KLM covers an area of approximately 2 419 km^2 and in 2007 had a total population of 73 274 people. Compared to the population size of 2001, when the population stood at approximately 70 695 people, this means that the population within the KLM grew at an average rate of 430 people per annum or a total of 2 580 over the 6-year period between 2001 and 2007. This population growth did not have a significant impact on the population density of the area, increasing it by an average of 1.1 persons from 29.2 persons per km2 in 2001 to 30.3 persons per km^2 in 2007.

Aberdeen Plain (ECDMA10) is an area of low population density, estimated at around 0.5 persons per square kilometre or a total population of 6 538 people (year unknown). This DMA accounts for more than one fifth (22.8%) of the total district area that extends over 13 308km^2.

The NMBM has a slightly smaller land surface area than that of the KLM and extends over 1 959km^2. Despite the fact that the NMBM has a smaller land surface area than the KLM, the total population size within the NMBM is more than 10 times that of the KLM and in 2007 stood at approximately 1 050 930 people. This is indicative of the fact that the NMBM is much more urbanised than the KLM, serving as a pull factor for people to move to the city in search of better economic and living conditions. The population within the NMBM therefore also increased on average at approximately 7 525 people per annum, thereby also increasing the population density rate on average at approximately 3.9 persons per km2 per annum. However, such a population density is still regarded as fairly low when compared to an urban area such as Johannesburg where the population density in 2007 stood at approximately 2 364 people per km^2.

The socio-economic report provides a more detailed breakdown of information with regards to population trends within the respective municipalities covered by the proposed corridors, number of households, racial population groupings and gender distribution.

The specialist report provides a table that gives an overview of the population demographics of the study area in relation to South Africa as a whole, the province and the district. It is evident that there are more females than males in the study area, which, might be ascribed to the migrant labour patterns in South Africa where the male moves to a different area in search of work. If this is the case, it can very well be assumed that these males are employed elsewhere and would therefore not be seeking work at the proposed project. It is therefore necessary to take cognisance of the fact that the majority of work seekers might be female.

- Education

An overview of the educational profile for the study area on local municipal level is provided in Figure 43. No information could be obtained for the educational profile of the ECDMA10 and therefore the baseline educational profile is focused on the KLM and the NMBMM. Overall, it would appear as if the study area is characterised by a semi-skilled to skilled population, which is reflected in the fact that only a small minority (only 4.9% in the KLM and 3.4% in the NMBMM, unknown for the ECDMA10) of the population has had no form of formal education. A more detailed breakdown of educational dynamics is provided in the socio-economic specialist report.

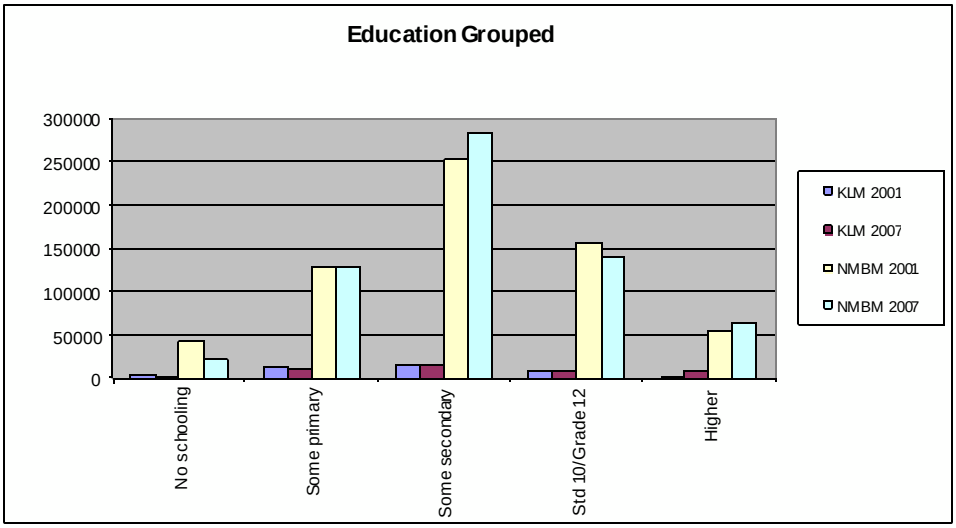


Figure 43: Educational profile (Grouped) for the affected local municipalities

One of the driving forces behind social change is educational attainment, which in turn is linked to poverty levels, as there appears to be a correlation between the level of educational attainment and income levels. People with higher educational levels tend to be economically better off, and therefore contribute more to the reduction of the unemployment rate. Educational attainment is also linked to poverty in the sense that funds are required to further studies, therefore people living in less favourable economic conditions tend to be unable to further their education, which in turn holds them in a downward poverty spiral.

Implications for the proposed development:

- The baseline demographic profile provides an overview of the local area that will be affected to ensure proper planning that will affect the least amount of people during both construction and operation phases; and
- The baseline educational profile provides the project proponent with an indication of the skills levels that might be available in the area in an attempt to predict whether or not it would be possible to source labour and services from the local community.

- Economical Processes

The following baseline features and trends are considered to be of importance in the project area:

o The motor industry manufacturing sector

The largest car manufacturer in the country, Volkswagen South Africa, a wholly owned subsidiary of Volkswagen AG, is situated in Uitenhage. General Motor's SA is a locally owned organization, while Ford SA is another Port Elizabeth based Original Equipment Manufacturer. The Struadale Ford engine plant manufactures and exports the Rocam engine used in a number of different Ford models. Nelson Mandela Bay is also home to automotive component manufactures that are well positioned to serve top Eastern Cape exporters Volkswagen South Africa, General Motor SA and Daimler Chrysler SA in East London. (Eastern Cape Development Corporation, 2009).

o The Coega IDZ

Industrial Development Zones (IDZs) are purpose-built industrial estates geared for duty-free production for exports, and they play an important role in South Africa's economic planning and development. They provide transport, logistics and business services tailored for export-oriented industries. The Coega IDZ is a combination of 11 000 ha of sector specific zoned land with purpose built infrastructure. Positioned alongside is the Port of Ngqura – South Africa and Africa's largest deepwater port, developed to expand South Africa's harbour and shipping freight handling capacity. Coega will host several large-scale industrial and trade facilities, as well as purpose designed power generation facilities. The aim is to enable growth in the manufacturing, transport, resource and energy sectors (Coega Development Corporation, 2009).

o Agriculture

The historically strong coastal dairy industry is growing rapidly as more farmers in the high rainfall coastal zone change to dairy farming. The province currently provides some 20% of South Africa's milk from farms along the coastal belt, including those in the Kouga Local Municipality (Kouga LM) and the Nelson Mandela Bay Metro Municipality (Nelson Mandela Metro). There are several initiatives being considered to expand processing from a plentiful raw milk base to UHT milk, milk powder, and speciality cheeses. There is further potential in high-quality competitive dairy exports to new international markets (Eastern Cape Development Corporation, 2009).

o Tourism

The coastal area from Oyster Bay to Jeffrey's Bay is a popular coastal tourist destination during holiday periods for South Africans living elsewhere in the country. A significant percentage of homes found in the towns of Oyster Bay, St. Francis Bay, Aston Bay and Jeffrey's Bay are

seasonal holiday homes utilised by non-resident owners. The trend of holiday home ownership along the Southern coastline has been a major driver of property price increases and is responsible for supporting a number of industries such as construction. It has also increased development pressure by increasing incentives for owners of agricultural land to convert these to new rural developments, new residential areas or intensive tourist venues. A more detailed breakdown of the tourism environment is reported in Section 7.10 of this report and within the Tourism Specialist Study in Appendix 9.

- Regional Industry Size

The proposed project is located in two main regions namely the Kouga Local Municipality (LM) which is located in the Cacadu District Municipality (DM) and the Mandela Bay Metropolitan Municipality (NMBMM). Industry size indicators for the Kouga LM area and the NMBMM indicate a clear difference in economic contributions and productive activities in each area:

i. Agriculture contributes just over 15% of the Gross Geographic Product (GGP) of the Kouga LM but contributes minimally to that of the NMBMM;
ii. More than 30% of local GGP of the NMBMM is contributed by manufacturing, whereas the figure is substantially lower for the Kouga LM (12%);
iii. Construction and trade represents a bigger portion of the Kouga LM GGP than of NMBMM. A relatively large contribution by trade related businesses to local GGP is often a feature of smaller, less industrialised economy.

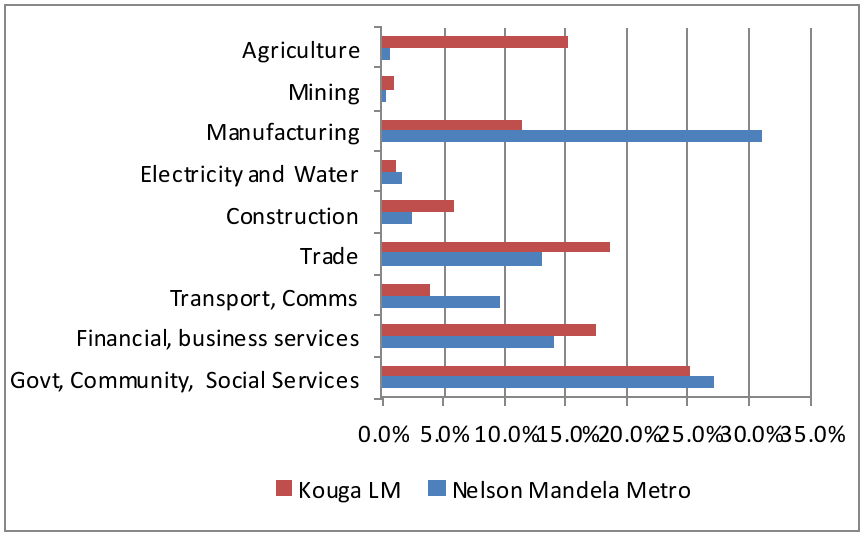


Figure 44: Industry contributions of the different municipal areas: (Source: Urban-Econ, 2009; NMBMM, 2006)

- Regional Employment

The Kouga LM area displays significantly higher employment that both the district and the Nelson Mandela Bay area. This may indicate that:

i. The local economy is able to generate a higher level of employment relative to the total population when compared to NMBMM and the Cacadu DM;
ii. Unemployed job seekers may be exported to bigger urban areas such as the NMBMM area as the location of businesses and industries creates the expectation of jobs there;
iii. Considering the level of development currently being planned in the area (Figure 45), employment in the area may improve further if local population figures remain stable.

The level of economic labour participation is similar at a local and regional level, varying between 36% for the NMBMM area and 38% for the Cacadu district as a whole.

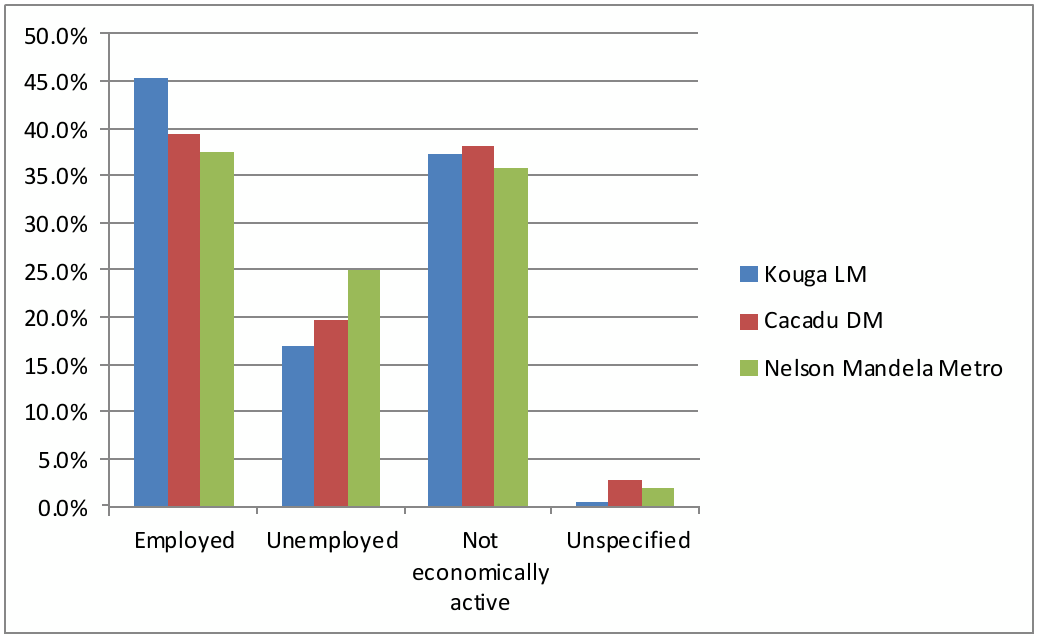


Figure 45: Employment levels in the different municipal areas: (Source: StatsSA, 2007)

- Regional Property Values

This study focuses on agricultural, smallholding and lifestyle estate land values as these are most likely to experience loss of value due to overhead power lines. Residential suburbs within the urban zone are not generally affected, under the condition that power lines run inside carefully

planned servitudes with visual mitigation, do not cross existing properties and are located at least 75m-200m from residential property boundaries (depending on visual impact).

Rural land experienced strong growth of average of 25% per year between 2005 and 2007 in the Eastern Cape, in a similar trend to other property types. However, recent price increases may have been tempered by the global financial crisis most likely due to a lack of available credit. Agricultural properties are currently for sale in the Humansdorp area at between R8000 and R50 000 per hectare (Ha) depending on:

i. Size – Smaller farms have higher prices per Ha
ii. Rainfall – Farms with rainfall figures above 750mm per year tend to be more expensive due to general higher land productivity
iii. Irrigation rights – These increase the land productivity and thus the price
iv. Capital investments – Dairy farming and poultry tend to increase firm prices due to the cost of the installations and machinery required.

It is expected that these prices may not always be achieved due to the economic conditions and that actual sale prices may be lower.

A farmer interviewed for this survey indicated that similar price ranges were appropriate in close proximity to the N2 on the border between the Kouga LM and the Nelson Mandela Bay metro areas, with a dairy farm reported to be recently sold for R30 000 per Ha. An area of unusually high property values was found on the banks of the Gamtoos river (explained below) which represents a convergence of land with irrigation rights (therefore high productivity) and intensive capital investments (central-pivot irrigation and dairy facilities).

- Selected Site Economic Features of Importance

During the economic baseline study of the Northern Corridor, a number of sites of economic importance were identified. These serve as examples to give a general indication of activity along the route and other economic activities not featured here may exist. In general, it was found that economic development is most intensive closer to the coastline due to the relatively flat terrain found on the coastal plain and adjacent river valleys. The features of importance as well as the area of intensive development have been depicted in Figure 46.

Figure 46: Location of examples of economic features of importance.

Table 15: Examples of route features of importance

Important features along the Northern Corridor alternatives		
a	High productivity agricultural operations and land.	An area of agriculture is found on two farms, namely Doringrug and Stillerus, which span almost the entire corridor in this area and is intensively irrigated. Further expansion of irrigation is also planned. The representative of these farms has supplied the following information about current activities: ▪ 896 ha in size with 196 ha irrigated by central pivot irrigation; ▪ 1400 Head of cattle is kept; ▪ R23 million turnover; ▪ Provides employment for approximately 22 people; ▪ BEE development trust with 27 beneficiaries dependent on farms;
A	Eco developments	Landowners within this area are pursuing developments relating to environmentally sustainable farming and tourism/hospitality. The following information was provided by a landowner of such a development: ▪ Rights obtained for guest house as well as conference facilities; ▪ Rights obtained to build five additional dwellings which will be Eco self sustainable homes; ▪ Ground has been designated as sacred by Khoi Trust due to reburial of Khoi remains; ▪ Agri-processing and spa facilities planned; ▪ Plans to market property as a natural setting for art events;
B	High productivity agricultural operations	A number of central pivot irrigation systems and dense orchards span the majority of the corridor on the farm Zuurbron in this area.
C	Dense division of smallholdings	The area in the Gamtoos river valley within the northern section of the Northern corridor is characterised by a dense subdivision of agricultural holdings with buildings and other improvements. The area is also intensely farmed, often with central pivot irrigation.
D	Extensive forestry operations	MTO Forestry manages the Longmore State Forest as a timber resource in this area and both the Northern and Southern firebreak routes of the Northern corridor will be mostly adjacent to the plantation. Some sections of the corridor are on productive plantation land however. Timber plantations are associated with the following approximate economic indicators: ▪ Production of 10.2 tons of pine per Ha ▪ Average annual revenues of R 4400 per Ha ▪ One job opportunity created for every 13 Ha planted
E	Dense division of smallholdings	The area in the Swartkops River valley within the Northern corridor is characterised by a dense subdivision of agricultural holdings with buildings and other improvements. The area is also intensely farmed, often with central pivot irrigation.

This means that:

- The baseline economic profile gives an indication of how people in the area make their living and the economic activities within a given society.

This is required in an attempt to minimise any potential negative impacts on people's livelihoods.

- Despite the high employment levels in the local area, unemployment is still high. The project might provide some employment relief, depending on the hiring practices used during the project and the extent to which local employment is prioritised.

- Institutional and Legal Processes

    - Municipal Services

The years between 2001 and 2007 saw a steady increase in the delivery of municipal services to the households within the study area. Municipal infrastructure backlogs are mostly confined to the previously disadvantaged township areas, and, as could be expected, in informal settlement areas. The outlying rural areas rely almost exclusively on water and sanitation services that are below RDP standard. In terms of water services, RDP standard is defined as piped water either within a dwelling or within 200m of such a dwelling. Sanitation services on par or above RDP standard is defined as any waterborne sanitation services that are connected to a municipal sewerage system or a ventilated pit latrine (VIP) system.

The socio-economic specialist report provides more detail on the municipal services of the affected area in relation to the province and the district as a whole.

Implications for the proposed development:

- The baseline institutional and empowerment profile gives an indication of the municipal services available, the local municipalities' ability to provide for additional connections if required (e.g. removing waste from site), and the capability of the area to provide in health and other emergency services.
- This information enables the project proponent and its appointed contractors to plan ahead by ensuring that they include keys aspects such as emergency management plans in their planning process and costing.

- Socio-Cultural Processes

A number of towns and villages occur across the study area. Each one has a unique socio-cultural profile. The specialist report describes the history of the large settlements within or close to the proposed northern corridor.

Implications for the proposed development:

- The history of an area serves as an indication on local residents' place attachment in terms of their collective past and the value they attach to certain areas or symbols;
- People with similar cultural backgrounds tend to gather and live together in demarcated geographical areas. Outsiders can affect the cultural dynamics of such groups; and
- Sense of place goes hand in hand with place attachment, which is the sense of connectedness a person/community feels towards certain places. Place attachment may be evident at different geographic levels, i.e. site specific (e.g. a house, burial site, or tree where religious gatherings take place), area specific (e.g. a residential area), and/or physiographic specific (e.g. an attachment to the look and feel of an area). The concept of sense of place therefore attempts to integrate the character of a particular setting with the personal emotions, memories and cultural activities associated with such a setting.

7.10 Tourism Assessment

This Tourism study was conducted by Faith Kalibbala of SiVEST and Paul da Cruz of Royal Haskoning DHV and a detailed report is provided in ***Appendix 9****.*

- Tourism in and around the proposed northern corridor

Where information could not be obtained on a local scale, provincial data is represented in this section. Statistics South Africa classifies tourism regions within provinces i.e. the "Algoa tourism" region which comprises of towns such as Port Elizabeth and Uitenhage among others; the "Rest of Eastern Cape" region which comprises of towns of St. Francis bay; Humansdorp, Jeffrey's Bay, Cape St. Francis and Paradise beach. These will be presented in the tourism demand section below.

- Tourism Trends as Related to Tourism Land Use

The proposed Northern Corridor falls within an important tourist area. This section categorises the tourism hotspots as follows:

i. Coastal nodes (Oyster Bay)
ii. Urban nodes (Oyster Bay, Humansdorp Hankey and Uitenhage)
iii. Rural nodes (Elands River Valley)
iv. Tourism Routes

v. Nature/ Wilderness Nodes (Groendal Wilderness Reserve, Stinkhoutberg Nature Reserve, Springs Nature Reserve)

In the specialist report each tourism node (Figure 47) is described based on area characteristics in terms of land cover class (urban, rural, commercial agriculture/forest), tourist attractions and tourism grow th potential.

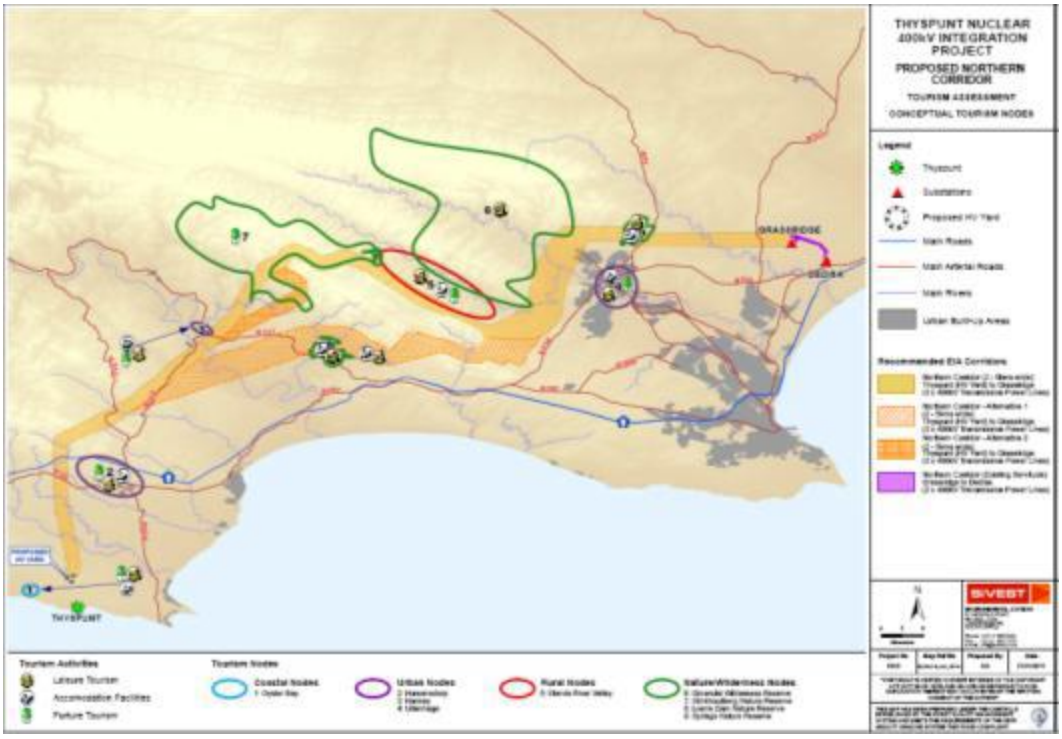


Figure 47: Tourism nodes potentially affected by the Northern Corridor

i. Coastal nodes

The one coastal node identified for the study area relevant to the northern corridor is Oyster Bay:

ii. Urban Nodes

The Urban nodes identified for the study area are:

- Humansdorp
- Hankey
- Uitenhage

iii. Rural nodes (Elands River Valley)

One rural node identified in the Northern Corridor study area is the Elands River Valley.

iv. Tourism Routes

Tourism routes that traverse the Northern Corridor include:

a. Baviaans Routes
b. Garden Route (N2)
c. Mohair Route
d. Kouga Wave Route
e. Kouga Heritage Route
f. Kouga Valleys Route

v. Nature/ Wilderness Nodes

The following Nature / wilderness Nodes occur in the study area:

- Groendal Wilderness Area and Wincanton Game Farms
- Stinkhoutberg Nature Reserve
- Loerie Dam Nature Reserve
- Springs Nature Reserve
- The Chan te Mar Game Farm and Honeyville Private Nature Reserve

- Tourism Supply

There are a variety of tourist attractions in and around the study area as described above

- Accommodation facilities

Tourist accommodation facilities in and around St Francis Bay, Cape St. Francis, Jeffrey's Bay, Patensie, Oyster Bay, Humansdorp, Hankey, Elands River Valley, Uitenhage are categorized as:

i. Bed and breakfasts,
ii. Guesthouses,
iii. Hotels/motels/inns/ lodges,
iv. Conference facilities,
v. Youth hostels/ backpacker
vi. Lodges,
vii. Caravan and
viii. Camping sites.

A list of accommodation facilities is attached in the tourism specialist report. Table 16 below indicates the approximate number of accommodation facilities in the study area.

Table 16: Accommodation facilities in the study area

Location	Total number of facilities	No. of rooms (approximately)
St Francis Bay, Cape St. Francis, Jeffrey's Bay, Patensie and Oyster Bay area	80	497
Humansdorp, Hankey	10	30
Elands River Valley	11	undetermined
Thornhill	2	7
Uitenhage	25	196
Port Elizabeth	334	6059

- Tourism Demand

    - Foreign and Domestic Tourists

Statistics provided by the South African Tourism Strategic Research Unit show that the Eastern Cape is the second least visited province (by foreign tourists) in South Africa and that this percentage dropped from 5.5% in 2008 to 4.6% in 2009. The Countrywide 2009 percentage of 4.6% foreign visitors was the lowest proportion of tourists visiting a province with the exception of Northern Cape which only captured 1.2% of the foreign tourists. The majority of foreign tourists visit the area for leisure and business purposes.

Bed nights sold refers to the total number of beds occupied by visitors. While the majority of the nights were spent in Bed and Breakfasts, backpackers, self catering and camping facilities, the least number of nights were spent in other accommodation (South African tourism, 2007). Tourism demand in the area of the transmission line relates primarily to the outdoor and wildlife aspects.

On a domestic level (domestic tourists), the Eastern Cape generated 13% of all domestic tourist arrivals and had the second highest proportion of overnight trips i.e. 14.8%. However, only 9.8% of domestic tourists made day trips to the province (Statistics South Africa 2009). KwaZulu-Natal generated the most domestic tourist arrivals i.e. 21.2% followed by Gauteng with 17.1% and Limpopo with 13.5%. The Western Cape generated 10.6% (Statistics South Africa 2009).

Based on a tourism questionnaire completed by several accommodation facilities owners/ managers in the study area, occupancy rates range from 20% to 90% and the busiest months are April and December (pers. comm. 2009). Other months of the year show relatively low occupancy rates.

On the other hand, between 2002 and 2005 in the Port Elizabeth and Uitenhage area alone, the occupancy rates in hotels were highest in February, March and November. Low occupancy rates were showed between April and July but start increasing from August onwards. The lowest occupancy rates were observed in July 2003 (Figure 48). (Data by KPMG obtained from Peter Myles, 2009).

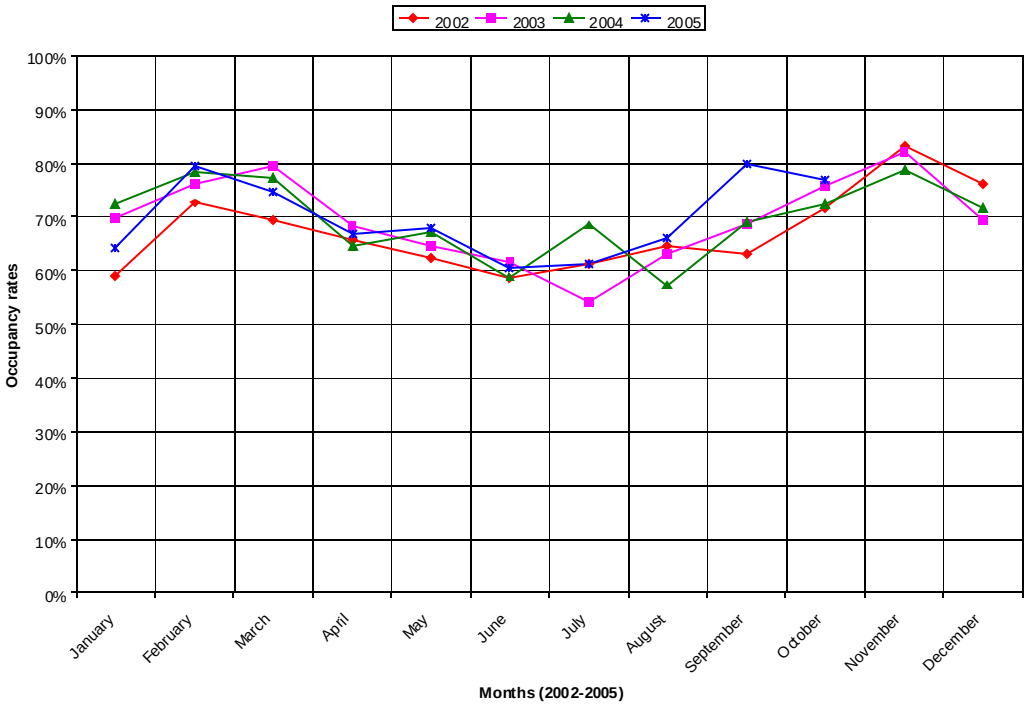


Figure 48: Average monthly occupancies per year for 2002 - 2005 (Data by KPMG obtained from Peter Myles, 2009)

Furthermore, all facilities in Port Elizabeth (PE) alone can accommodate up to 13, 831 people per night. Accommodation facilities in Uitenhage can accommodate 509 people per night and while those in Despatch can accommodate up to 30 people per night (Erenei Louw, Nelson Mandela Bay Tourism 2008).

- Business Tourism

This type of tourism reflects the tourist who visits an area fundamentally for business purposes (meetings, exhibitions). Any other tourism activities e.g. sight-seeing or game viewing is secondary. Meetings are the most attractive segment within the business tourism market. The meetings market can be divided into three organisational types, Inter-Governmental Meetings Corporate Meetings, Association / NGO and Academic Meetings. Corporate meetings occur year round and school holidays make off-peak months more attractive. On the other hand, exhibitions also attract a largely number of tourists, mostly domestic tourists. Between 2006 and 2007, Port Elizabeth accounted for 2% of exhibitions in the country (South African Tourism, 2007). It is

anticipated that business tourism presents trends for high occupancy during the week and lower occupancies over the weekend. The stays are normally longer than leisure based tourism. No information was available on average stay length. There is also lack of data on local and foreign arrivals.

Owners of the tourism facilities in the area around St Francis Bay, Jeffrey's Bay, Patensie and Oyster Bay partly rely on the business tourists for the success of their businesses.

- Leisure Tourism

Leisure is the primary purpose of visit to South Africa and in 2007 it accounted for 61.3% of visitors to the country. Leisure tourism is made up of a number of sub-groupings i.e. ecotourism (site seeing, seaside holidays, special events, family holidays on game farms, game viewing and photographic safaris) and hunting. Other leisure activities include sport (golf and water sports), visiting restaurants. Leisure tourism in the study area is boosted by the various special events in the area. For instance the Oyster Bay area is renowned for its excellent rock, surf and deep sea fishing. Tourists generally stay in the various accommodation facilities in the area. Visitors from the local area are also noted visiting the area for sporting purposes and visiting restaurants. There is no data (statistics) on the number of local and foreign leisure tourists that visit the area.

- Educational Tourism

Cape St Francis comprises a lighthouse which was built in 1878 and has now been declared a National Monument. Also, Jeffrey's Bay is famous for the Shell museum. All of these attractions are for educational purposes especially for school pupils and other interested local and international tourists.

- Passing Through

One of the main features of the southern Cape (incorporating parts of the Western and Eastern Cape Provinces) is the Garden Route, which is focussed on the N2 national highway. The Garden Route is a popular holiday destination attracting both winter and summer visitors. It encompasses some of South Africa's most beautiful beaches, mountains and rivers and there are several enjoyable activities such as hiking, ostrich riding, whale-watching, golfing, bungee jumping and swimming. The influence of the route to passing through tourists in this area is therefore enormous, especially as Port Elizabeth is an important point of departure / final destination for trips along the Garden Route. Other important tourist routes in the study area include; R75 (Mohair Route), R330, R331 and R332 (Baviaans Route) as well as R335 (the Great Addo Route).

- Description of the Current Tourism Environment in the Elands River Valley

Tourism is an important component of the Eastern Cape economy. In 2008/9, tourism provided R6,5bn-worth of revenue to the province, providing 68,752 jobs and providing a R12, 84bn contribution to the GDP of the province (Eastern Cape Tourism Board Annual Report 2008/2009). The wider Nelson Mandela Metro (greater Port Elizabeth) area provides an important tourism focal point in a provincial context, with its seaside attractions along with its excellent transport links and location in close proximity to a number of other provincial attractions such as the Addo complex and the Jeffrey's Bay / St Francis Bay seaside complex. The location of the Elands Valley on the outskirts of the Nelson Mandela Metro entails that it is well-placed to take advantage of the tourism economy based in and around the Metro. The Valley also has links to the Gamtoos Valley to the south-west through the Elands River Road which links the Valley to Patensie, and provides direct access to part of the Baviaanskloof Wilderness Area (Bergplaatz section). This section examines the tourism baseline of the Elands Valley in terms of the tourism activities offered and practiced in the Elands River Valley, and focused on the affected portion of the valley.

- Access links to the Elands River Valley

Tourists, by definition are temporary visitors to an area, and as such physical access into the area is an important factor in terms of the facilitation of visitation to an area and in identifying current and potential access and visitation trends to that area.

The Elands Valley can be accessed from two points only, and as such is relatively remote. The most utilised access is from the Rocklands area, off the R334 provincial road which links the N2 to the west of Port Elizabeth and the Uitenhage area. The Elands Valley road runs westwards from Rocklands, and apart from the un-surfaced Wincanton Road which intersects this road west of Rocklands (linking it to the R334 west of KwaNobuhle), it is the only access to the eastern part of the Valley. The Elands Valley Road traverses the valley along its entire length, heading up the valley towards the Bergplaatz section of the Baviaanskloof Wilderness Area. Past the access to Bergplaatz, the road connects to the R331 provincial road west of the town of Patensie. The R331 is the primary access into the main part of the Baviaanskloof, and links the reserve with the lower parts of the Gamtoos Valley around Hankey and Loerie and the N2 highway. It is important to note that there is no public access to the Elands Valley from the Groendal Wilderness Area to the north, or from the Longmore Forest to the south.

Most tourism facilities and accesses described below are most easily accessed from the eastern entrance to the Valley, as most of these facilities are located within the eastern part of the Valley. The Elands Valley Road provides the most direct access into the Baviaanskloof from the Uitenhage area, and forms a radial route joining Uitenhage, Patensie, and the areas to the south-east around Hankey and the Lady Slipper area.

- Tourism-related activities and facilities in the Elands Valley

Information provided by the Elands River Conservancy to the TTLIP team indicated that the cultivation in the form of wheat farming was the predominant agricultural activity in the Valley in

the past. In this sense the Valley was an outlying rural area beyond the Port Elizabeth and Uitenhage conurbations. Due to a climatic shift in rainfall patterns, wheat production decreased over the latter part of the Twentieth Century. In response to this transformation in landuse an important development occurred in the first decade of the current century when landowners in the valley increasingly started looking to ecotourism as a means to generate income (along with stock farming). This change led to the development of a number of ecotourism activities and facilities in the valley.

In terms of the current status quo, the vast majority of tourism operations in the valley are ecotourism-based activities. It is important to note that these have been set up in the context of the very undisturbed and natural character of the Valley, along with its scenic qualities (which are discussed in the visual section above). The facilities and activities which are present are thus based on the appreciation of / enjoyment of the natural and scenic qualities within the area. The following activities / facilities are thus offered in the Valley:

- Accommodation – various types
- Hiking
- Mountain biking
- Bird Watching
- 4x4 and quadbiking trails
- Hunting

Figure 49: Scenic View up the Elands Valley towards the Cockscomb Mountain

The table below lists the location of tourism facilities in the affected part of the valley.

Table 17 – Tourist Facilities in the affected part of the Elands Valley

Name	Type	Other Activities Practiced
Burrows Bush Camp and Trails	Bush Camp, Hiking Trails	Mountain Biking in the Longmore Forest
Llise Dodd Art Studio	Art Gallery	Landscape Painting Activities
Landela Christian Camp	Accommodation - Groups	Hiking Trails
Meadows 4X4 Trail	4X4 Trail	
Mountain View Camp	Accommodation - Bush Camp	Hiking, Fishing
Mpunza Lodge	Hunting Lodge	Hunting through professional hunting services
Offcamber Bush Camp	Bush Camp, 4X4-quadbike trails	Fishing, Game Viewing, Team Building activities
Offcamber Guesthouse	Accommodation - Guesthouse	
Sand River Getaway	Accommodation - Bush Camp	Mountain biking, hiking, birding
Tanglewood Camping Site	Accommodation - Camping	4x4 trails, mountain biking, rock climbing, canoeing, fishing, bird watching, hiking
Waverly Hills Christian Camp	Accommodation Facility – Groups (Dormitory)	Hiking Trails

There are other tourism activities that typically occur in the Valley including:

- Periodic Birdwatching trips to the valley by BirdLife Eastern Cape;
- The Elands Valley Road running up the Valley appears to be utilised by bikers on weekends as a destination for day trips out of Port Elizabeth and Uitenhage; and
- Paragliding activities.

It should be noted that the Mount Ingwe Lodge has been omitted off the list above, although it is located in the Elands Valley. The location of Mount Ingwe is sufficiently distant from the affected part of the Valley that it would be unlikely to be affected in any way by the proposed power lines.

o Tourism Routes incorporating the Elands Valley

An important component of tourism in a South African context is the self drive route, as evidenced by a number of routes that are promoted from a tourism perspective in this part of the Eastern Cape. All of the municipalities in the wider area (Kouga Local Municipality, Cacadu District Municipality and the Nelson Mandela Metro) promote tourism routes as a means by which to encourage potential tourists and visitors to explore the respective attractions of the area. The Elands Valley does not fall within any local municipality, rather being part of the Aberdeen Plain DMA, and as such the Cacadu District Municipality is responsible for the management of the

area. In spite of its close proximity to the Kouga LM, and parts of the Nelson Mandela Metro, the Elands Valley is not actively marketed as part of any tourism route initiatives of these municipalities. The only current tourism route of which the Valley forms part is the "Travel Baviaans" Route as marketed by the Cacadu DM. This route links the Elands Valley to the wider Baviaans Area, along the Elands Valley Road as a link into the eastern part of the Baviaanskloof. (Please note that the proposed Slipper Way Tourism Route is discussed in the tourism potential section below).

- Tourism Potential of the Elands Valley

In terms of the assessment and discussion of the potential impacts of the proposed TTLIP power lines on the tourism environment of the Elands Valley, the tourism potential of the Valley needs to be explored. This is important, as tourism activity in the Valley is relatively recent and a number of initiatives and plans are afoot to further develop the tourism activities and marketing of the valley. Tourism is increasingly being viewed as an important sustainable economic activity in rural contexts which would be responsible for generating income and thus sustaining people's livelihoods. As such the development of tourism in the Valley is likely to be an important trend that will determine the future socio-economic profile of the Valley and its residents.

As described above, the Valley has a current relatively small tourism base, with a handful of tourism facilities, mostly located in the eastern part of the Valley. Ecotourism as a significant revenue generator for the residents of the Valley is relatively young, and could experience more growth into the future, as the residents of the valley attempt to find ways in which to sustain their livelihoods in a context of increasing uncertainty and instability in the wider farming economy.

The growth of tourism, especially ecotourism would depend on a number of factors, including:

- the prevailing economic climate
- the marketing of tourism activities and initiatives
- the nature of access into the area and physical linkages to other areas
- the management / preservation of its natural features
- the continued aesthetic appeal of an area

In terms of the last factor, the aesthetic appeal of the Valley in terms of its scenic beauty and its largely natural character is a strong positive factor that would greatly facilitate the further development of tourism-related activities aimed at the enjoyment or appreciation of these qualities. As described in more detail in the visual impact section above, the Valley is characterised by outstanding scenic value, being flanked on both sides by mountain ranges. The low density of human settlement and the relatively limited physical footprint of historical agricultural activities engender the Valley with a highly natural character that is able to be utilised by the future ecotourism activities. The Valley is flanked along much of its length by formally protected areas (nature reserves); hence this natural quality is unlikely to change in these areas. The natural character of the valley is being preserved and even enhanced by a number of factors,

including to the relatively recent establishment of a conservancy in the Valley – the Elands River Conservancy. One of the main aims of the Conservancy is to restore the Valley to a relatively natural state and to encourage, low impact, sustainable farming practices. In terms of this aim, large parts of the Valley have aesthetically benefitted from the removal of extensive stands of alien invasive vegetation by the Working for Water Programme, which has started the regeneration of areas of natural thicket and fynbos vegetation, thus enhancing its natural character. Whether increased human visual intrusion in the form of high voltage power lines would adversely affect the growth of tourism activities is explored in the sections below.

The Valley lies in an area of transition between the fynbos and thicket biomes, and as such shares natural features typical to both. This mix of natural features typical to both biomes, along with the presence of pockets of indigenous forest provides an interesting mix of fauna species, in particular birds. Birdwatching has the potential to draw large numbers of birdwatching tourists to an area, and the avifaunal assemblage of the Valley could increasingly provide a strong attraction to nature lovers and birdwatchers in particular.

The tourism potential of the Valley is enhanced by the relative proximity of the area to the PE / Uitenhage Metropole. The relative ease of access between the Elands Valley and these urban areas is evidenced by a number of residents of the Valley who travel to and from PE and Uitenhage on a daily basis to their places of work. One of the benefits of the Valley's tourism attractions is thus that the Valley is very easily accessible from the PE / Uitenhage areas, while being sufficiently distant from the these urban areas to give the visitor the impression that one is in the countryside away from the city. The Valley is accessed by a tarred road from Rocklands up to a point, at which it becomes an unsurfaced road. This road is of sufficiently good quality to allow the usual access of all vehicles to the length of the Valley. The utilisation of the Valley by bikers for day trips from Port Elizabeth has already been mentioned above.

In addition the Elands Valley Road provides a potentially important linkage between parts of the wider area that are otherwise physically separated by mountain ranges. Although not being a main arterial road, the Elands Valley Road has significant potential to be promoted and utilised as a scenic route for tourists to access the Baviaanskloof (see below) and the upper parts of the Gamtoos Valley. The linkage provided to these areas via the scenic Elands Valley route is currently very poorly marketed. If this were to change it could potentially provide much more tourist visitation to the Valley (although a large portion of this would be 'passing through', this would provide good exposure to the Valley and its attractions).

It is impossible to predict whether the tourism supply (i.e. the tourism-related facilities and activities) in the Valley will be increased in the future, as this depends on many factors, as listed above. The proposed marketing of the Valley as part of a wider tourism route, as discussed below, could provide an important impetus in growing the current tourism baseline in the Valley through increased exposure.

- Proposed establishment of the Slipper Way Route

At the time of writing, a number of residents and business owners within the wider area to the west of the PE Metropole have launched an initiative to promote businesses in this area, and to facilitate the collective marketing of attractions in and around this part of the province. The initiative has been named the Slipper Way Route. The Route as planned encompasses the rural areas to the west and north-west of Port Elizabeth, including the Elands Valley, Rocklands Area, Lady Slipper Area, Blue Horizon Bay and the Van Stadens area. The initiative is being modeled on the idea of a tourism meander, with its inspiration being the highly successful Midlands Meander in KwaZulu Natal. The Midlands Meander offers a platform for the marketing of a number of tourism-related businesses and services in a geographic area from Mooi River to Hilton. It is a successful and well-known grouping of tourism routes that has been highly successful in marketing the Midlands of the KZN as a top tourism destination within the province and in a wider South African context.

The Slipper Way's main aim would be to promote businesses within this area, and to raise awareness of their existence. In addition to providing information on businesses, services and attractions within the area of focus, the Slipper Way would also function as a community forum by which important community-related notices could be distributed to its members.

The initiative is completely self-funded at this stage, and is in the early stages of its development. The first publication advertising the Slipper Way and its members is planned for the middle of September 2012, with the Slipper Way's constitution proposed to be set up shortly thereafter (Gary Gradwell, pers. comm.). In addition to a regular publication, advertising on the web and via social media is also planned. As of yet the Slipper Way management committee has set up no linkages with the tourism boards of the Nelson Mandela Metro, or Eastern Cape Tourism and Parks.

If successful, the establishment of the Slipper Way would be a critically important tool for marketing the Elands Valley as an attractive tourism destination for residents of, and visitors to the PE Metropole. Critical to this would be the exposure of currently little-known and little-advertised tourism establishments within the Valley to a much wider audience, and the promotion of the Valley as an enticing day visit or overnight destination from the Nelson Mandela area. Should the Slipper Way prove to be a successful venture that increases turnover of its member businesses, this would have a strong possibility of attracting other residents in the Valley to set up tourism-establishments. Increased turnover for member businesses could potentially allow increased capital expenditure in upgrading current facilities at these locations, thus improving the tourism product offered. As stated above, it is impossible to say whether the establishment of the Slipper Way would definitely increase tourism demand in the area that would potentially drive an increase in the tourism supply and the tourism product offered to visitors, but it is likely that if proven successful, that the Slipper Way would improve the perception of tourism as an income

generator in the Valley, and encourage the investment in existing and potential new tourism-related ventures.

- Context of the Baviaanskloof Mega-Reserve and the associated World Heritage Site

The location of the Elands Valley in relation to areas potentially providing tourism demand to the Valley (sources of potential customers / visitors), as well as the location of the Valley in relation to other tourism focus areas have been discussed above. Although the Valley is located in close proximity to the Groendal Nature Reserve, a direct public linkage between the two areas is highly unlikely due to the lack of access to the parts of Groendal that border the Valley. The situation is different with respect to the Elands Valley and the Gamtoos Valley (as discussed above the Elands Valley Road provides a tourism link between the two valleys). An important linkage between the Elands Valley and the Baviaanskloof Wilderness Area / Mega-Reserve also exists. This is critical to the Valley in a tourism potential perspective.

The Baviaanskloof is a very large conservation area, both privately and publically owned. The area encompasses the Baviaanskloof Mega-Reserve, which came into being in 2002. According to Boshoff, (2005) the Baviaanskloof Mega-Reserve Project seeks to:

- conserve the area's spectacular biodiversity,
- protect its critically important role as a provider of water, and
- promote sustainable economic development opportunities based on the natural assets of the area, principally by:
  - securing a large consolidated core formal protected area, the primary management objective of which is the conservation of biodiversity,
  - establishing a multi-owner contractual reserve network around the core area in which different land-use patterns and forms of conservation status are reconciled and aligned with biodiversity conservation initiatives,
  - managing the mega-reserve network through a partnership between government, the private sector and civil society,
  - realising prospects for improving the livelihoods of people living in the rural parts of the region, and
  - exposing people to sustainable ways of using the area's natural resources, and incentivising their adoption.

The second aim tied to promoting sustainable economic development (highlighted in bold above), is particularly relevant to the Elands Valley and the Elands River Conservancy. Importantly the Valley and the Conservancy fall within the ambit of the planning area of the Mega-Reserve. The Baviaanskloof Mega-Reserve encompasses the Stinkhoutberg and Groendal Nature Reserves, both of which border the Elands Valley, and as such the valley forms an integral part of the Mega-Reserve and ensuring ecological linkages between its divergent protected components. Most of

the aims of the Mega-Reserve listed above relate to conservation and sustainable land management; however the Mega-Reserve has enormous tourism potential and this would link into the aim of promoting sustainable development opportunities (above).

In addition to the Mega-Reserve, the area also forms part of a proclaimed World Heritage Site. In 2004 the Baviaanskloof Nature Reserve was proclaimed, along with seven other reserves in the Cape Floristic Region, as a World Heritage Site. The reserves were nominated under two criteria – significant ecological processes, and biodiversity and threatened species (Boshoff, 2005). The sites' exceptional natural beauty and its culturally important sites and artefacts were used to support the successful nomination.

The presence of the Mega-Reserve and the World Heritage Site provides a context in which sustainable economic development through tourism activities can be promoted and occur within the Elands Valley. According to Boshoff (2005) the appropriate development of the reserve's tourism potential, will undoubtedly provide a number of socio-economic benefits at the local, regional and national levels. Conservation-linked economic development opportunities in this context include those on privately owned land (e.g. private nature reserves and conservancies).

Potential exists for properties in the Elands River to be formally included within the Mega-Reserve through stewardship agreements. In this way much of the wider Valley could be included within the wider Mega-Reserve and be marketed as such. Through its location, current environmental status (in terms of its environmental state and ecological assemblages) and management practices (relating to the Elands River Conservancy), many properties within the Elands Valley would fulfil criteria for inclusion and could be developed, and importantly in this context, marketed as part of the Mega-Reserve. Through the inclusion of properties within the Elands Valley within the Mega-Reserve complex, their tourism marketability and attractiveness to visitors of the area would arguably be increased, as it would place them in the context of one of South Africa's largest protected areas, and would place them although not directly, within the ambit of the Cape Floral Kingdom World Heritage Site.

The Elands Valley is also strategically located as on the entrances to the wider Mega-Reserve, in particular as the entrance to the Bergplaatz component of the reserve, and possibly in future to the Stinkhoutberg component, which is currently highly inaccessible. The establishment of the Slipper Way may enhance this potential, if the Elands Valley is marketed as one of the gateways to the Mega-Reserve, and if properties' inclusion within the Mega-Reserve complex were able to be marketed through this forum.

Figure 50: The Tanglewood Camping Site

7.11 Heritage Assessment

This Heritage study was conducted by Johnny van Schalkwyk an independent consultant and a detailed report is provided in ***Appendix 10****.*

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial element (Stone Age) as well as a much later colonial (Settler farmers) component. The second component is an urban landscape dating to the colonial period.

- Rural landscape

The rural landscape has always been sparsely populated and it was only in a few areas where, through the application of specific economic strategies such as shellfish harvesting or farming, people succeeded to occupy a section of the region for any length of time.

  - Archaeological sites

Archaeological sites in this area predominantly date to the Stone Age as early farmer communities, also referred to as Iron Age communities did not settle this far south (Derricourt 1977).

The Stone Age archaeology of the larger region has been intensively researched and published in a number of publications and reports. The most significant contribution is that of Dr J Binneman of the Albany Museum (e.g. Binneman 2001, 2003, 2005, 2006/2007, 2009, 2010a, 2010b). In addition, a number of other publications and Heritage Impact Assessment reports also indicate the occurrence of sites/find spots in the larger region (Archaeology Contracts Office 2010; Deacon 1970; eThembeni 2007; Kaplan 2007; Van Schalkwyk 2010).

Table 18: Archaeological and palaeontological sites

NHRA Category	Archaeological and palaeontological sites
Protection status	
General Protection - Section 35: Archaeology, palaeontology and meteorites	

Figure 51: View over Amanzi springs and some stone tools found in the Grassridge area.

The stone tools (bottom left of figure 26 above) are not from the region and are only used to illustrate the difference between Early (left), Middle (middle) and Later Stone Age (right) technology.

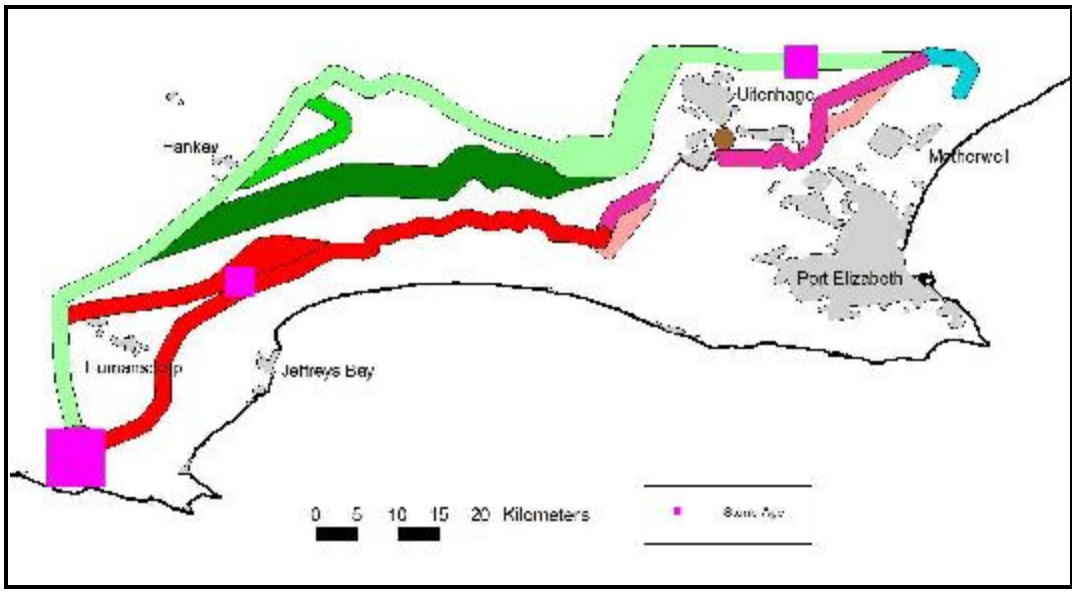


Figure 52: Map showing the location of known concentrations of Stone Age sites.

Human occupation of the larger geographical region took place since Early Stone Age (ESA) times.

Occupation of the region seems to have increased during the Later Stone Age (LSA). These people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. A number of sites are known to occur in the region, located to the west and north of the study area. Also, for the first time (with a limited number of exceptions) we get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA. The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual beliefs.

Although the study area probably contains hundreds of sites dating from the Early Stone Age, through the Middle and Later Stone Age, within the proposed power line corridors they tend to cluster in three distinct areas as indicated in Figure 52.

One of the more important Early Stone Age sites in the region occurs at Amanzi Springs, in close vicinity of the northern corridor (located to the west of the Grassridge Substation, in the vicinity of the Coega River valley). The site was excavated by Deacon (1970). Apart from stone tools dating to the Early and Middle Stone Age, the site also produced well-preserved bone, wooden artefacts

and seed remains (probably food material), making this a very significant site. At present it is unsure what else remains of this site as well as similar springs in the region, but the site is viewed to have a high significance on a regional level.

In addition, stone tools dating to the Early and Middle Stone Age have been identified in the Grassridge area (Kaplan 2007; Van Schalkwyk 2010). These are found in a secondary context (open surface material), where they have been exposed in gravel terraces by rivers and streams. Normally this material is viewed to have a low significance and the localities where they are found are referred to as find spots rather than sites.

Further to the west, in the southern corridor, research by Binneman (2001; 2006/2007) has shown that a number of very important Later Stone Age sites occur in the Kabeljous River area (roughly to the north of, and inland of Jeffrey's Bay). In fact, Binneman was able to demonstrate that that these sites belong to a whole new artefact tradition, which he termed the Kabeljous industry. As such they shed important light on human occupation and cultural development in the region and therefore have very high significance on a regional level.

At the Thyspunt end of the corridors, the density and significance of sites dating to the Stone Age have ably been demonstrated by the work done by Binneman (2001, 2005, 2006/2007) and the Heritage Impact Assessment done for the site selection of the proposed power station (Archaeology Contracts Office 2010 - ACO) and we accept that that report would be read in conjunction with the current report. In summary they report that Later Stone Age sites are very common within 200m of the shoreline, and common within 400m. After 400m the frequency drops off, but in places can be expected to occur as much as 5km from the shore. These sites, according to the ACO, represent the heritage of a great many South Africans who have KhoiKhoi and/or San linage. We concur with the findings of that report. However, as the High Voltage Yard of the power station is proposed to be located to the north of the shifting dunes, on the farm Penny Sands, in an area which is intensely cultivated, there would be less of a risk of the power lines impacting on these types of sites.

- Farmsteads

Farmsteads are complex features in the landscape, being made up of different yet interconnected elements. Typically these consist of a main house, gardens, outbuildings, sheds and barns, with some distance from that labourer housing and various cemeteries. In addition roads and tracks, stock pens and wind mills complete the setup. An impact on one element therefore impacts on the whole.

Table 19: Buildings, structures, places and equipment of cultural significance (Farmsteads)

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 34: Structures older than 60 years	

Figure 53: Examples of farmsteads identified in the region.

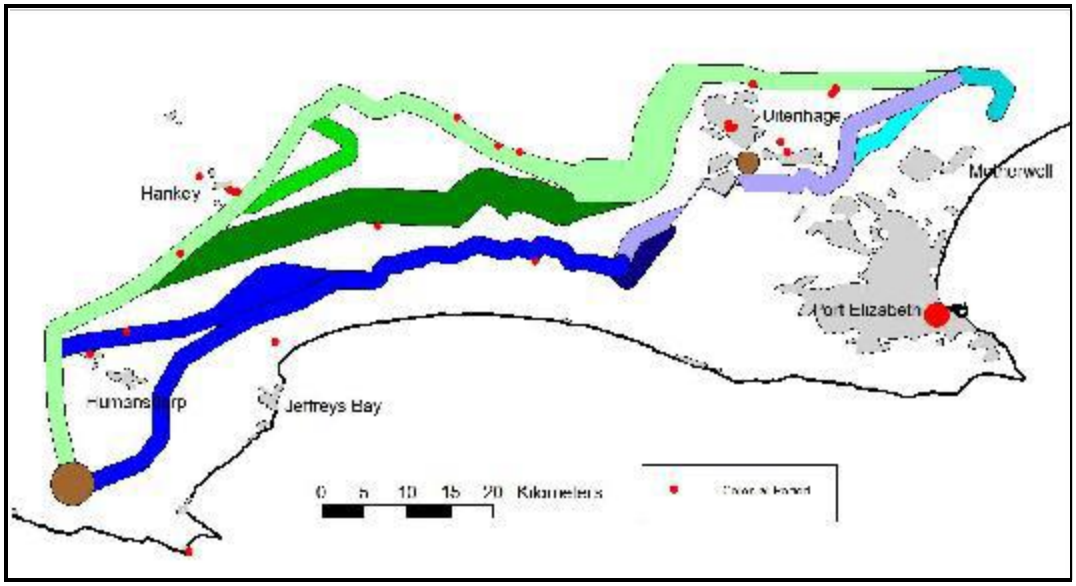


Figure 54: Distribution of Colonial Period sites.

By the late 18th century some Dutch speaking settlers took up farms, but it was only with the arrival of the 1820 Settlers that population numbers started to take off. An investigation of the Title Deeds of most of the farms under consideration indicated that they were surveyed as early as the 1820s, implying that they would have been occupied by colonists since then.

The architecture of these farmsteads can be described as a modified English vernacular tradition that was brought by these settlers to the Eastern Cape region after the 1820s. Farm buildings were generally single storied but town houses often reached two floors. Walls were thick and built in stone and the ridged roof, thatched or tiled, was terminated at either end by simple linear parapet gables (Figure 54)

In some cases outbuildings would be in the same style as the main house, if they date to the same period. However, they tend to vary considerably in style and materials used as they were erected later as and when they were required.

- Cemeteries

Apart from the formal cemeteries that occur in municipal areas (towns or villages), a number of these, some quite informal, i.e. without fencing, occur in both corridors. Many also seem to have been forgotten (Figure 55), making it very difficult to trace the descendants, should the graves need to be relocated.

Table 20: Graves, cemeteries and burial grounds

NHRA Category	Graves, cemeteries and burial grounds
Protection status	
General Protection - Section 36: Graves or burial grounds	

Figure 55: Examples of burial places.

Most of these cemeteries, irrespective of the fact that they are for land owner or farm labourers (with a few exceptions where they were integrated), are family orientated. They therefore serve as important 'documents' linking people directly by name to the land.

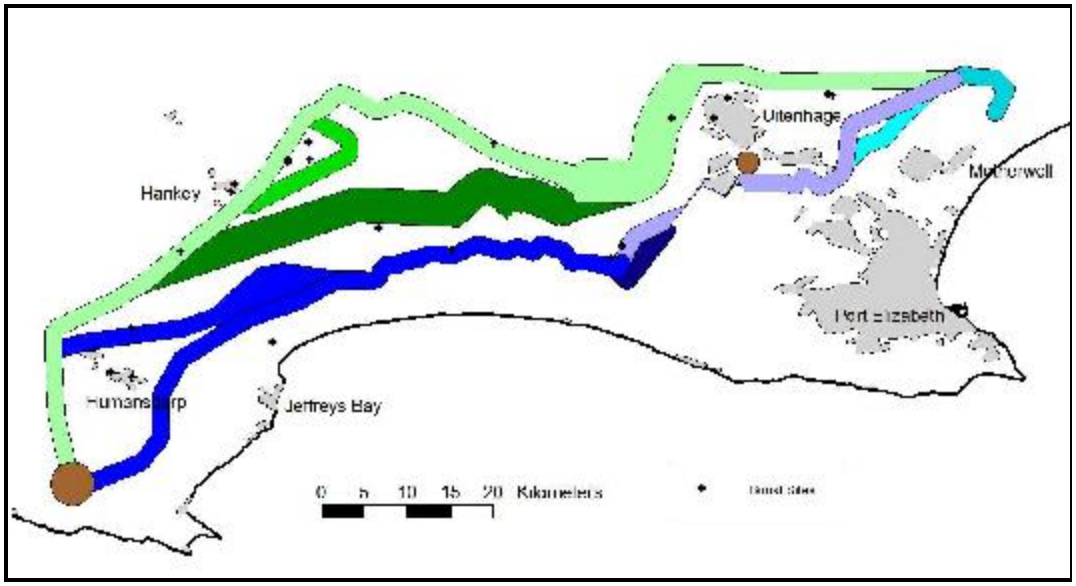


Figure 56: Distribution of cemeteries and burial sites.

- Infrastructure and industrial heritage

In many cases the infrastructure and industrial heritage aspect of heritage is left out of surveys, largely due to the fact that it is taken for granted. However, the land and its resources could not be accessed and exploited without the development of features such as roads, bridges, railway lines, electricity lines and telephone lines.

Table 21: Buildings, structures, places and equipment of cultural significance (Infrastructure and industrial heritage)

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 34: Structures older than 60 years	

Figure 57: The narrow gauge railway line across a steel bridge at Hankey and an old brick chimney.

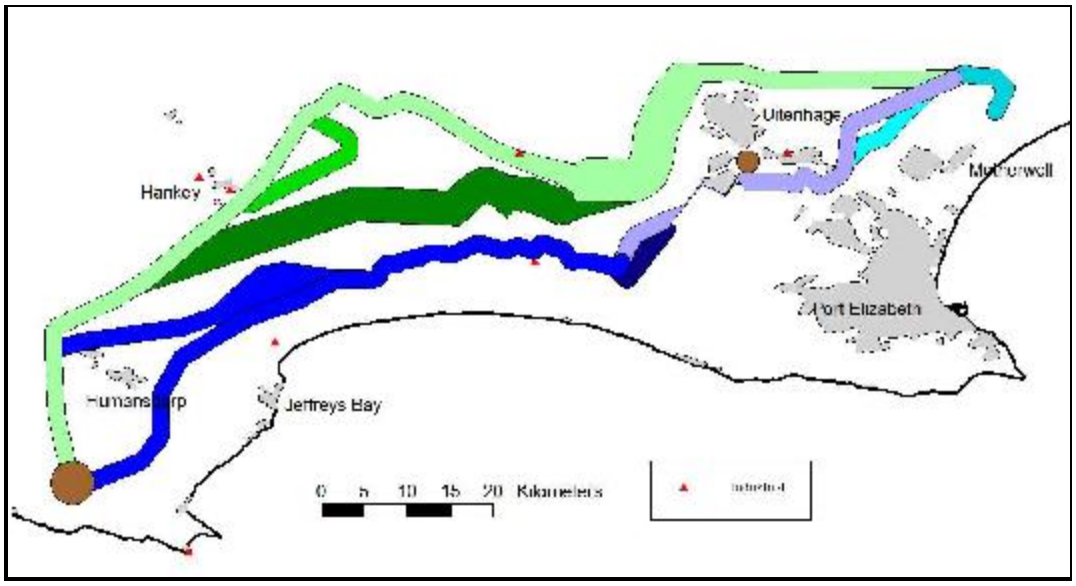


Figure 58: Distribution of infrastructural/industrial heritage sites.

A variety of bridges, railway lines and other features that can be included in this category occur in or near the proposed corridors. The oldest such features in the region would be the tidal fish traps found in the coastal area, ascribed by some as dating to the Later Stone Age times, although many were constructed and used during early historic times. Other interesting features are the so-called Philips Tunnel that was developed in the late 19th century to bring water to communities in the Hankey region. The Bulk River water supply system that supplies Port Elizabeth with most of its water is a further example.

Most features that can be included in this category are located on the outer fringes of towns.

- Urban landscape

The proposed corridors pass in close proximity of the outskirts of a number of towns. This part of the study area falls within that zone usually located on the front edge of (city) urban-sprawl where the land previously used for agricultural use (only) have become subdivided into small holdings. What used to be a large single agricultural unit or farm now consists of tens of small properties. These units do not have their economic base in traditional agriculture but are sustained by a variety of land uses and economic activities with strong urban associations. This phenomenon happened in the past forty to fifty years. Therefore most of the built fabric dates from this period. The result is that any historic farmsteads older than 60 years that may have existed have either disappeared or have been 'upgraded'.

Research on colonial settlement in the region seems to be more focussed on what can be described as conventional history (Bryer & Hunt 1987; Butler 1974) and is less concerned with heritage sites and features, although some regional studies/surveys have been done (Binneman 2003; Ferreira 1983).

Table 22: Buildings, structures, places and equipment of cultural significance (Urban landscape)

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 34: Structures older than 60 years	

Table 23: Graves, cemeteries and burial grounds (Urban landscape)

NHRA Category	Graves, cemeteries and burial grounds
Protection status	
General Protection - Section 36: Graves or burial grounds	

Table 24: Buildings, structures, places and equipment of cultural significance

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 37: Public Monuments and Memorials	

Figure 59: Various heritage elements found in the urban environment.

- Proposed development

The area around the Honeyville Farm to the north-east of Humansdorp close to the R332 road is earmarked to be used as a cultural centre. In addition it is planned to relocate KhoiSan remains from the St Francis Bay area to a local mountain top in the Honeyville Nature reserve. However, as this is still in the planning stage, it is difficult to determine any impact the development of the power line would have on the site.

7.12 Palaeontological Assessment

This Palaeontology study was conducted by Bruce of the University of the Witwatersrand and a detailed report is provided in Appendix 10.

The Palaeontological assessment was undertaken at a desktop level. Please refer to the palaeontological report for a detailed description of how the study area's geology relates to the proposed corridors.

- Geology of the area

The proposed routes for the transmission lines will cross a wide spectrum of geological formations which range in age from Precambrian to Plio-Pleistocene.

As all the rocks underlying the study area are of sedimentary origin and are of late Precambrian to Quaternary age they are potentially fossiliferous. Fossils are known from the following stratigraphic successions:

- Caenozoic Cover:

i. Kinkelbos Formation – Occasional marine trace fossils.
ii. Alexandria Formation -A rich marine and estuarine invertebrate fauna of molluscs, corals, bryozoans, brachiopods, echinoids, crustaceans, microfossils, sharks' teeth
iii. Grahamstown Formation - Fragmentary plant remains

- Uitenhage Group
  i. Sundays River Formation - A rich and diverse marine invertebrate fauna (comprising mainly molluscs but also has brachiopods, bryozoans, echinoderms, ostracodes, corals, vertebrates (plesiosaurs), microfossils (foraminifera), trace fossils
  ii. Kirkwood Formation - This formation has yielded a reptilian fauna comprising mainly sauropod and theropod dinosaurs, turtles, crocodiles, invertebrates (bivalves, crustaceans), a rich diversity of plant remains of ferns, cycads and conifers, as well as microfossils.
  iii. Enon Formation - As this formation comprises mostly cobbles and boulders fossils are scarce but wood and bone fragments have been reported

- Bokkeveld Group:
  i. Ceres Subgroup – Diverse marine invertebrate fauna comprising molluscs, brachiopods, bryoans, conulariids, echinoderms, ostracods, trilobites, tentaculitids, trace fossils, the only vertebrates are rare fish remains, primitive vascular plants

- Table Mountain Group:
  i. Baviaanskloof Formation - Marine invertebrate fauna comprising brachiopods, molluscs, trilobites and bryozoans.
  ii. Goudini Formation – Invertebrate trace fossils.
  iii. Cedarberg Formation - Rich variety of marine invertebrates including arthropods, condonts, brachiopods, molluscs, jawless fish.
  iv. Peninsula Formation - Invertebrate trace fossils
  v. Sardinia Bay Formation – microscopic acritarchs, and invertebrate trace fossils

- Gamtoos Group:
  i. Lime Bank, Klein Rivier, Kaan and Van Stadens formations – Microscopic acritachs, no other fossils yet discovered but there is a potential for stromatolites and early metazoan organisms

7.13 KhoiSan Heritage Assessment

This Heritage study was conducted by Mary Patrick of Cape Archaeological Survey and a detailed report is provided in ***Appendix 10****.*

- Cultural Landscape & Disposition of Land

Interviewee Chief Williams "The KhoiSan people roamed over South Africa, before the arrival of colonial people and KhoiSan sites can be found throughout the study area, particularly at Jeffrey's and St Francis Bay. All of these sites are in the hands of 'white' farmers and the KhoiSan have been excluded from partnership with government about how to manage this landscape. The KhoiSan is the First Nation People of South Africa and would like to be recognized as such. We believe that over three hundred KhoiSan sites will be impacted by the development and we wish to be consulted about this".

"The KhoiSan group do not want land, they want recognition in government structures about their heritage and their right to comment on this as First Nation People".

"How do KhoiSan fit into the proposed development, we have not been consulted about this, and we are financially not able to carry the cost of attending meetings"

"The present government says that we can practice our culture but we are not even recognized as the First Nation People"

"No funding / resources have been made available since 2005 to represent KhoiSan people".

"Over 300 KhoiSan sites have been identified in the study area, some at Oyster Bay, three sites at Cape St Francis Bay and some in the Thyspunt area. We previously worked with Johan Binneman who identified some of these sites but he is now working with another group and this is a problem for us. There is a perception that these are 'white' run groups that do not serve our interest".

"Our group previously asked that an archaeological specialist meet with Chief Johnny Jenson and myself but the specialist did not turn up for the meeting".

"Some people in our community are poor and cannot afford the fare to attend public meetings'.

Interviewee Mrs. Margaret Coetzee. The following information was collected by Teleconference, 3 September 2012, from the Provincial Head of the Gamtkwa National KhoiSan Group of South Africa and as a Member of the KhoiSan Development Council. Her concerns relate to all the middens and burials identified along the coastline that "prove" that the KhoiSan people were the first to occupy the coastline. "We are concerned that we are the last group to be consulted about

these large developments and only get to hear about them long after the specialist studies have been completed. For 70 years the KhoiSan group has tried to negotiate with various governments to highlight the identity of our people".

- Environmental Landscape & Sustainability

Interviewee Chief Williams "The KhoiSan people are concerned about the overall suitability of the Thyspunt development and the impact that this will have on the environment and on people's lives".

"Will the development bring destruction of the landscape or development? All people must benefit, especially the KhoiSan".

- Relocation of Human Remains

Neither Chief Williams nor Ms Coetzee are familiar with the KhoiSan heritage related developments in the Honeyville area that include the relocation of human remains from St Francis Bay. Chief Williams is however aware of the human remains found at Pappiesfontein in 2008-9 and records his concern that his group were not consulted regarding reburial.

Interviewee Ms Celeste Booth provided a list of thirty- seven archaeological sites, accessioned at the Albany museum, that are located in the study corridor (see Appendix 4 in the main KhoiSan Heritage Report). The sites represent Middle and Late Stone Age sites, one historical structure, ten rock paintings, one cave deposit, nine shell middens and two middens with associated human burials. Several copies of Binneman's (2004-5) published reports on archaeological research along the South-Eastern Cape Coast was included. The results of this work is key to understanding human adaptation to changing environmental constraints.

Ms Booth confirmed that the relocation of the human burial from St Francis Bay to the Honeyville area did not occur. Negotiations around this process appear to have stopped and no current impact is perceived.

- Conclusions

The report found that a memory of KhoiSan culture exists in the minds of the people interviewed, they regard themselves as indigenous on account of their descent from the populations who inhabited the country prior to and at the time of conquest and colonization. The establishment of the present State boundaries, irrespective of their legal status, does not mean that the KhoiSan people have lost their own social, cultural and political institutions. The current engagement with Environmental Stakeholders, and indirectly central government, is seen as a response to the lack of recognition of the displacement of KhoiSan people from their traditional homelands in the Eastern Cape.

The prevailing narrative of the KhoiSan therefore needs to be understood within a cultural landscape of violence and sacred space. The two colliding narratives correspond to two notions

of sacralization which can be translated into the idioms of continuity and closure. Both find expression in the modern political arena. This work is best described by the social anthropologist Katherina Schramm (2011) in a series of essays for East Germany, Croatia, Bosnia, Ghana and the Holy Lands. In Southern Africa the Department of Arts & Culture also recognizes this dichotomy and has made provision in the National Heritage Resources Act during the public consultation phase to consult and record stories of memory and sacred space. At least two case histories from the Western Cape speak to the departments commitment to these ideals; Patrick (2000, 2002, 2005) at St Cyprians, and Malan (2003) at Prestwich Place.

In the midst of political transformation, the KhoiSan claim as First Nation People who wish to reestablish their 'tribal' identity to address their disturbed sense of community, and reconnect them to the land, is accepted. The KhoiSan attachment to the land is not disputed, Behar (et al) 2008 constructed a matrineal (mtDNA) ancestry profile of the present KhoiSan in Southern Africa and they were able to demonstrate that their lineages diverged from the rest of humanity at 90 000 – 150 000 years BP. This time frame equates with the Middle Stone Age technologies in Southern Africa and that by 40 000 BP additional lineages occur in the KhoiSan mtDNA profile which equate with the Later Stone Age in Southern Africa. Archaeological sites that relate to these time frames are located with the context of the Thyspunt Integrated Transmission Project. These sites are of LOCAL, NATIONAL and INTERNATIONAL significance. Geneticists have been able to demonstrate that these small groups of early humans in South African populations remained in geographic and genetic isolation until migration during the Late Stone occurred. Thereafter the dispersal of people through Africa occurred from the South to the North until new groups of genetically distinct populations occur via the Bantu expansion (Behar et al 2008:1137). In light of this we consider the KhoiSan claim that they are South Africa's First Nation People to be fair.

More difficult, for the purpose of this assessment, is to pinpoint a memory of specific sites that relate to the intangible aspects of KhoiSan culture, such as areas where medicinal plants were collected, specific geographical areas where people were displaced from the landscape and songs, poems, skills and language that convey the memory of the Gamtkwa diaspora.

The majority of landscapes affected by the TTLIP are relic and organically evolved. To aid understanding, and appropriate heritage management, the following maps highlight the importance of the cultural landscape to the Gamtkwa KhoiSan. The maps have specifically been included as they reflect the earliest description of Late Stone Age sites, named after the farms where the archaeological artifacts were found, under the direction of Hewitt from the Albany Museum in 1910 and later by Goodwin 1935 (see Figure 60). Figure 61 shows the geographical distribution of people named by Maingard as the lost 'tribes' of the Cape and Figure 62 the burial places of Late Stone Age people from the Eastern Cape described by Morris.

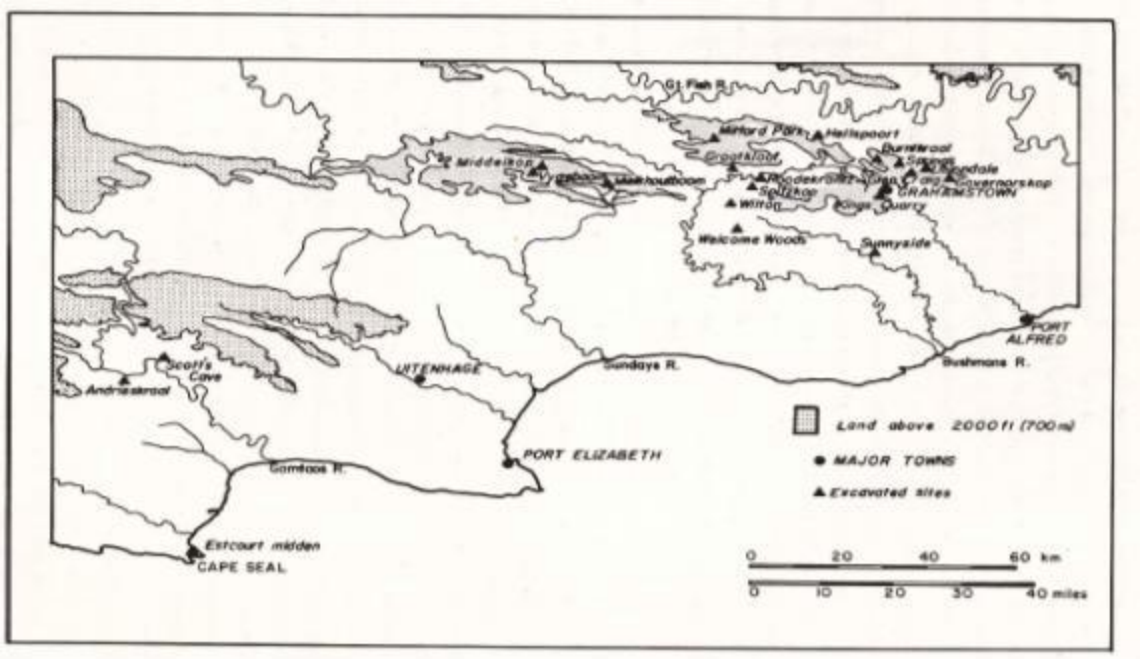


Figure 60: Spatial distribution of Late Stone Age archaeological sites in the Eastern Section of the Cape Folded Mountain Belt that speak to the footprint of a relic landscape. The names of farms where the features were found were used to record caves and rock shelters (Source: H. Deacon 1976).

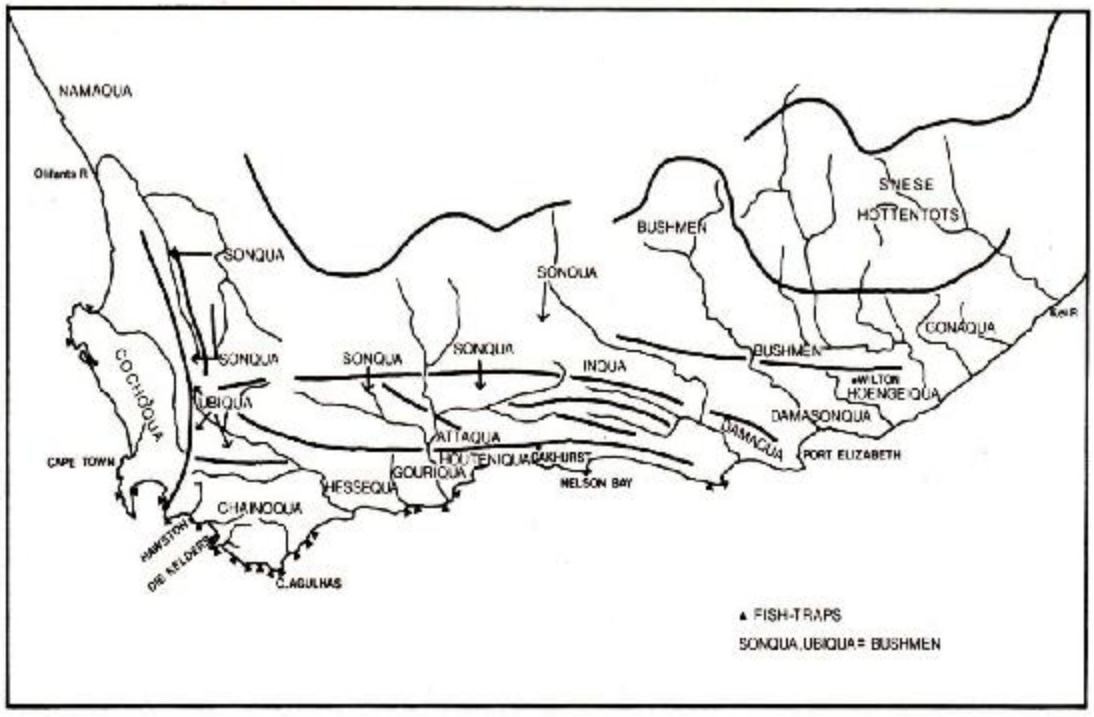


Figure 61: Historical distribution of Southern African people recorded by Maingard in 1931, viewed for the purpose of this research, part of an organically evolving Landscape (Source: G. Avery 1969: 112).

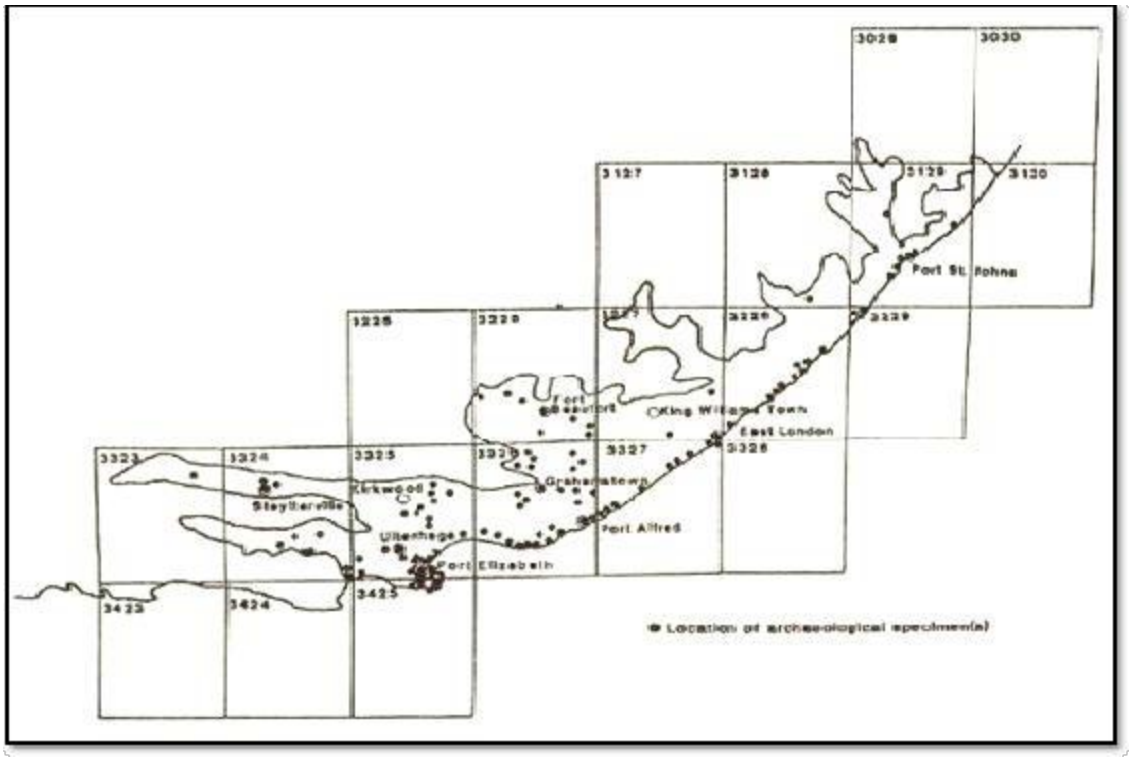


Figure 62: Map of the Savanna Biome and the distribution of Holocene burials in the Eastern Cape (Source: Morris 1992).

7.14 Agricultural Potential Assessment

This Agricultural Potential study was conducted by Kurt Barichievy of SiVEST and a detailed report is provided in ***Appendix 7****.*

- Soil Characteristics and Soil Potential

According to the ENPAT database the proposed corridors and alternatives cross a variety of soil groups (Figure 63). This variation is caused, in all likelihood, by the dissimilarity in underlying geology and topography. The area from Thyspunt to north of Jeffrey's Bay is dominated by soil groups associated with a plinthic catena. Soil depths in this area generally range between 0 and 0.75 metres (Figure 64). A catena is defined as a sequence of soils of similar age, derived from

similar parent material but having different characteristics due to variation in topography and drainage (Soil Classification Working Group, 1991). Soils in a catena sequence will typically range from well drained (e.g. Hutton Soil Form) near the hilltop to poorly drained in the valley bottom.

The Northern Corridors crosses the Gamtoos River Valley, which is dominated by deep deposits (greater than 0.75m) and which is associated with a higher agricultural potential than the surrounding areas.

Once the Northern Corridor passes the town of Hankey it crosses rocky areas and areas dominated by shallow soils forms i.e. Mispah and Glenrosa with a typical depth of less than 0.45m. This trend continues until west of Uitenhage where the Northern Corridor cross the Swartkops and then Coega River Valleys which are associated with deep alluvial deposits; classified as high potential soils.

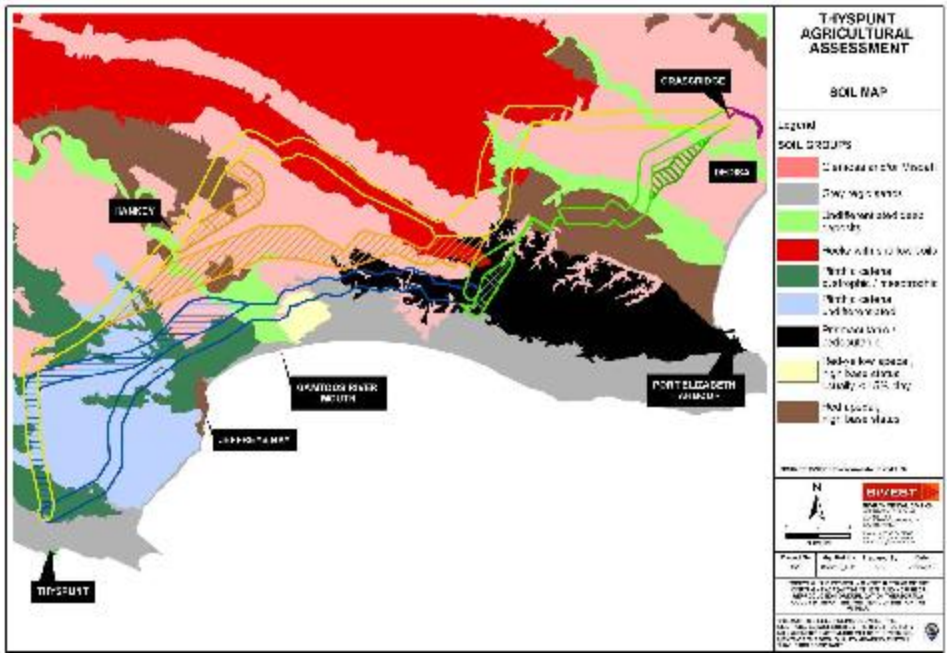


Figure 63: Soil Map

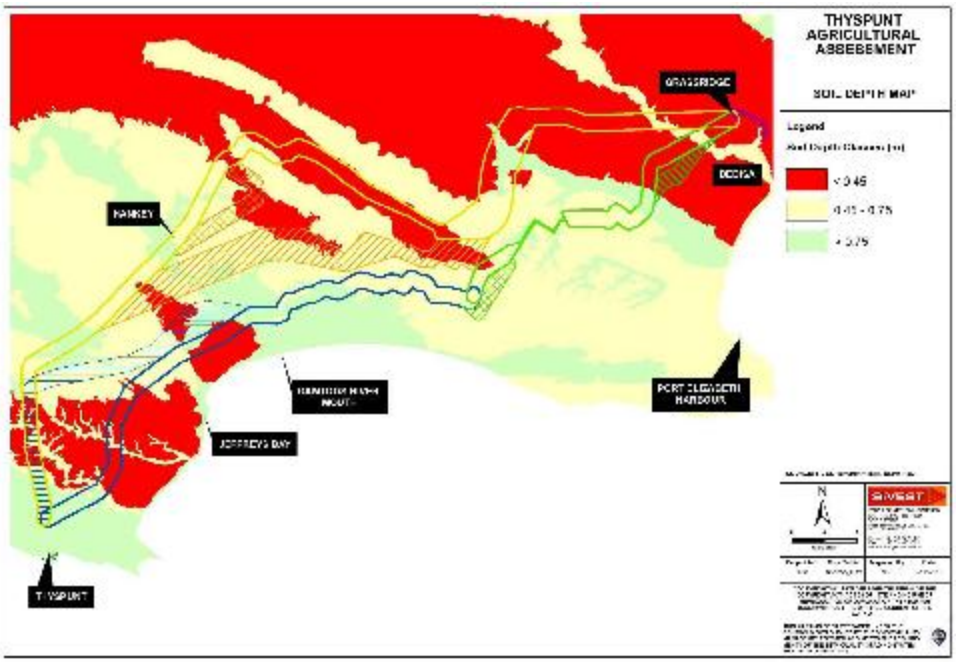


Figure 64: Soil Depth Map

The ENPAT Database also provides an overview of the study area's agricultural potential based on its soil characteristics, it should be noted this spatial dataset does not take *prevailing climate into account*. Areas which are suited to arable agriculture are generally found within flood plain and valley lines. As the corridors move away from these areas the soil potential decreases and is only suited to grazing / forestry where climate permits.

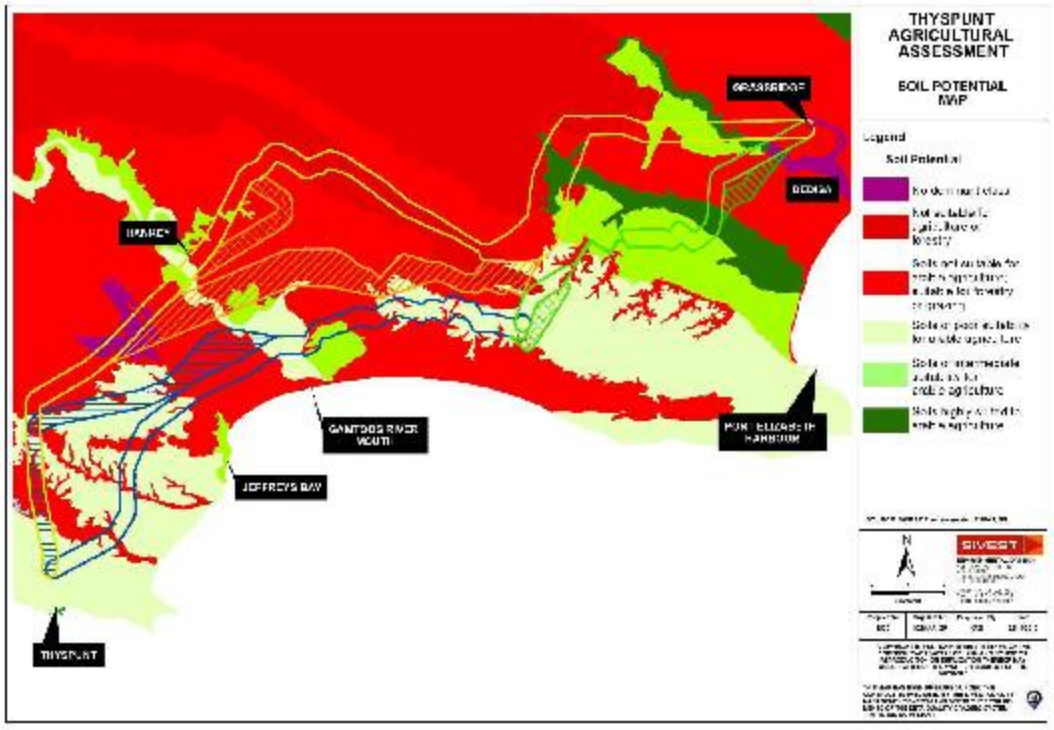


Figure 65: Soil Potential Map

The desktop study indicates that agriculture is the dominant land use and that high potential agricultural land, is a scarce resource in the region. Consequently areas of high soil potential and / or high agricultural value need to be protected from non-agricultural land uses and developments. A generally accepted assumption is that high soil potential is located in and adjacent to flood plains and along river / valley lines. It is in these areas where the potential impacts associated with the proposed power lines will be most significant and where careful planning and routing will be of paramount importance, when viewing Agricultural Potential in isolation.

- Delineation and rating of current agricultural activities

An agricultural delineation and rating system was developed in order to classify areas of high agricultural value. The desktop study indicates that high potential agricultural land is concentrated in flood plain areas and in river / valley lines, and that these areas generally correspond to well-established agricultural activities. Skirting, spanning or avoiding these areas of high agricultural value should significantly reduce the predicted impacts of the proposed power lines.

Agricultural activities were classified into 1 of 3 classes as summarised below:

- **Low Value:** Includes unimproved and improved grazing land with limited formalisation of agricultural fields.

- **Medium Value:** Includes dry land and irrigated crops and pasture where formal fields are clearly visible. This class includes crops and pasture irrigated by non-centre pivot systems.
- **High Value:** Includes crops and pasture under centre pivot irrigation, orchards and chicken broiler farms.

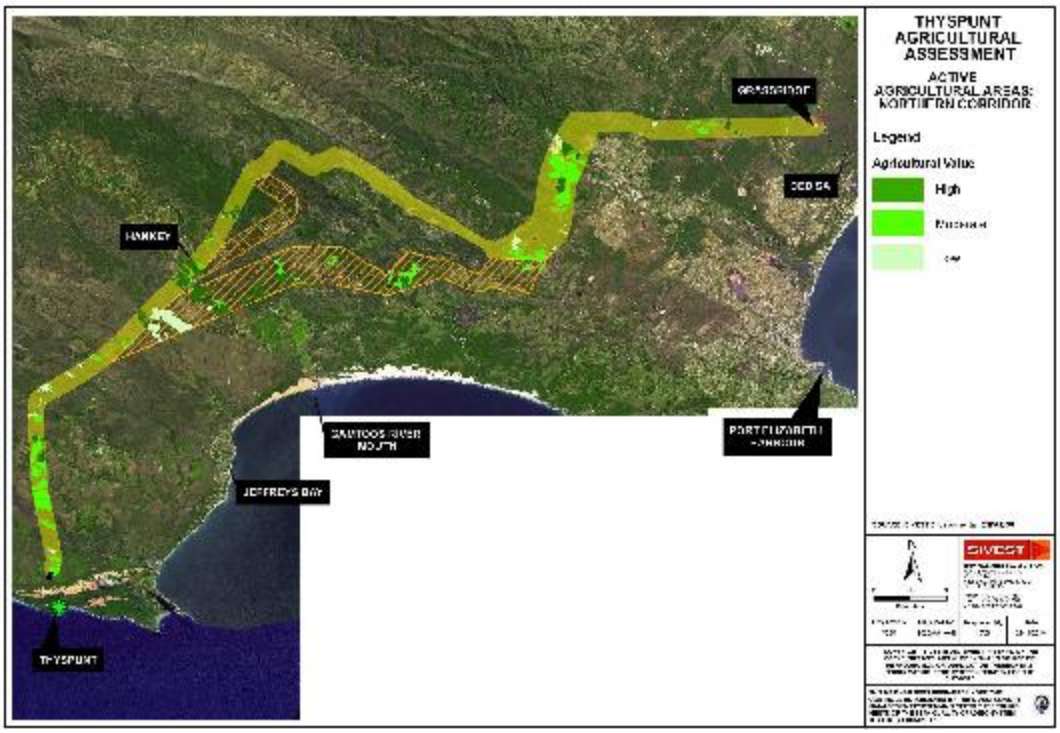


Figure 66: Map of the active agricultural areas and their current agricultural value (Northern Corridor and Alternatives).

- Initial hot spot identification

The results from the delineation and rating of current agricultural activities were used to identify preliminary agricultural "hot spots". Agricultural hot spots, in the context of this assessment, are defined as areas with high agricultural value which cover large portions / cross sections of a proposed corridor. In most cases agricultural hot spots corresponded to where a recommended EIA corridor crossed a major river system (Figure 67). Agricultural activities are concentrated in these areas due to the proximity of a reliable source of irrigation water and the occurrence of rich alluvial soils.

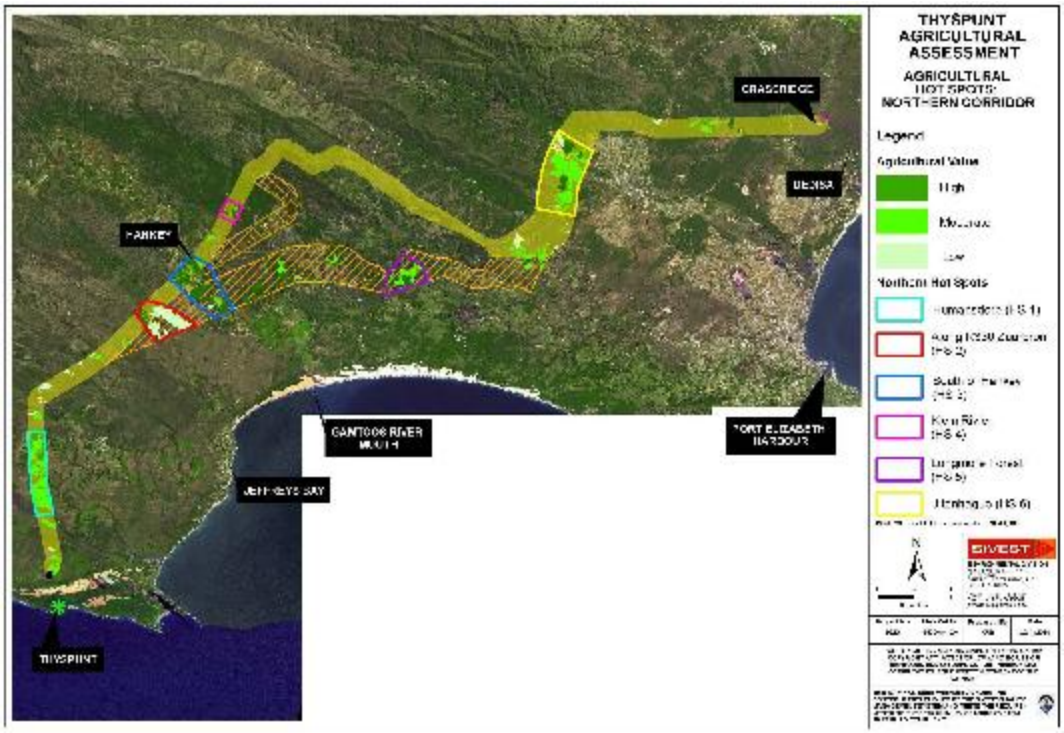


Figure 67: Agricultural hot spots (Northern Corridor and Alternatives)

- Agricultural Hot Spots: Northern Corridor

    - Northern Hot Spot 1: Humansdorp

The first agricultural hot spot identified along the Northern Corridor is located West of the town of Humansdorp adjacent to the R102 (Figure 68). According to the cadastral information for the area Farms Elandsjagt (Farm No. 687), Platjedrift (Farm No. 348) and Geelhoutboom (Farm No. 349) fall within this hot spot. From correspondence this area influences the Doringrug and the Michda Trusts.

This area is dominated by irrigated pastures including a number of centre pivots (Figure 68).These pastures are used as fodder for the numerous dairy herds. During the site visit it was noted that most of the irrigated pasture and centre pivots are concentrated in the eastern portion of the proposed corridor. However, it has been brought to the attention of SiVEST that the land owners of Michda Trust, also plan to develop another 3 centre pivots in the western portion of the Northern Corridor.

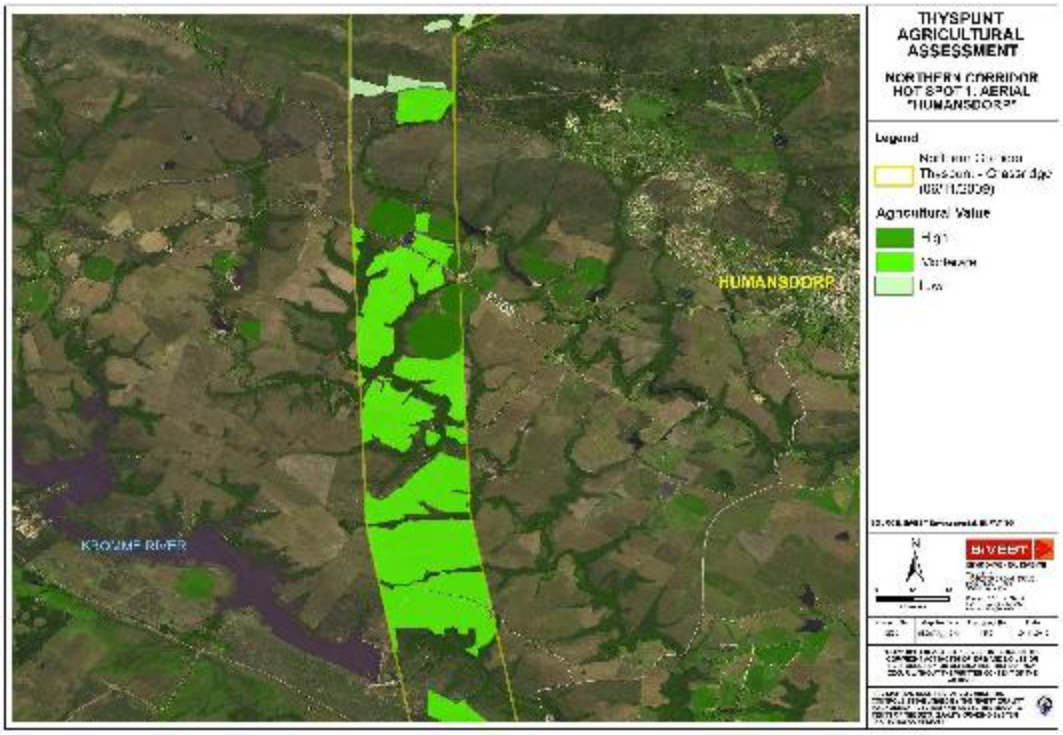


Figure 68: Northern Corridor: Agricultural Hot Spot 1 "Humansdorp" Aerial

o Northern Hot Spot 2: Along the R330 “Zuur Bron”

The second agricultural hotspot identified along the Northern Corridor is the Farm of Zuur Bron. The owner has large portions of land which could potentially be impacted by the transmission power lines in both the Northern and Southern Corridor. The majority of the land is non-irrigated grazing land, however the original Northern Corridor crosses an almost complete band of high value agriculture, including irrigated maize and pasture on either side of the R330.

Figure 69: Northern Corridor: Agricultural Hot Spot 2 "R330 Zuurbron" Aerial

o Northern Corridor Hot Spot 3: South of Hankey

The third agricultural hot spot identified along the Northern Corridor is located to the south of Hankey and adjacent to the R330. A number of farm portions under the name of Gamtous Wagendrift are situated perpendicularly to the Gamtoos River flood plain. These farms are relatively flat and characterised by high agricultural potential and value.

Irrigated maize, vegetables and citrus creates a band of high value agricultural land and infrastructure, which stretches across the entire width of the original Northern Corridor (Figure 70 and Figure 71). Due to this band of high value agriculture the placement of the three proposed transmission power lines within the original corridor would not be feasible without creating a major disruption to the agricultural production and resulting in a sterilisation of the land.

Figure 70: Centre pivot irrigation infrastructure near the town of Hankey (Northern Hot Spot 3)

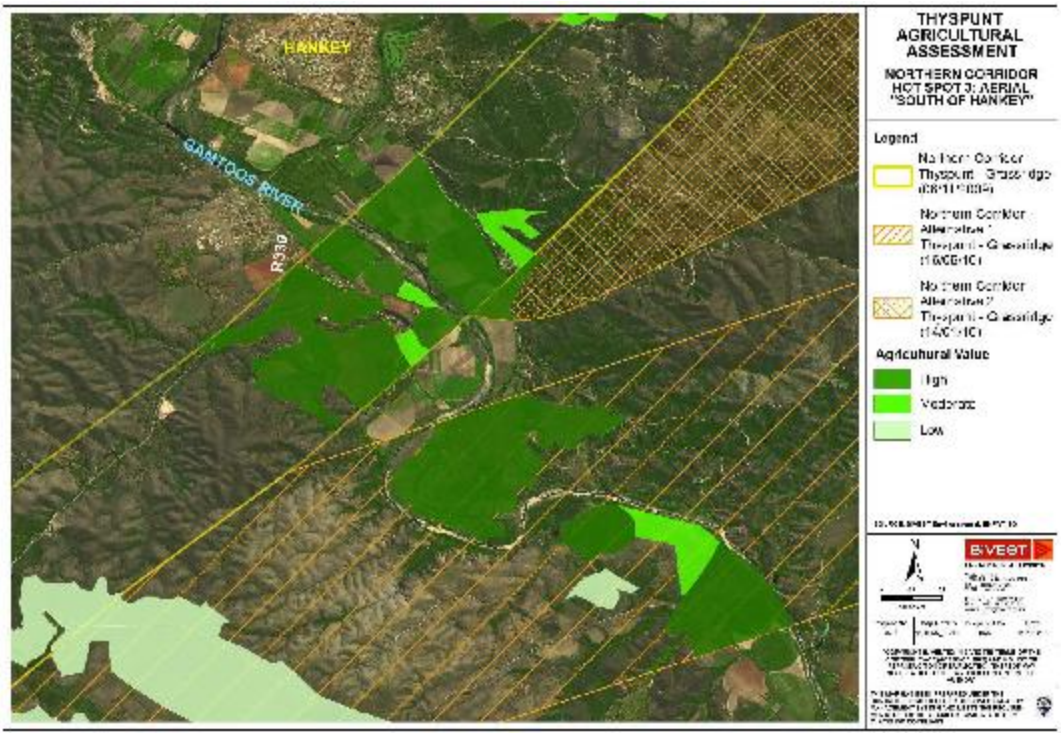


Figure 71: Northern Corridor: Agricultural Hot Spot 3 "South of Hankey" Aerial

- Northern Corridor Hot Spot 4: Klein Rivier

The fourth agricultural hot spot identified along the Northern Corridor is located to the north-east of Hankey. A number of farm portions under the name of Klein River and Kleinfontein are situated on either side of a perennial river, which joins the Gamtoos River from the north.

A band of high value agricultural land stretches across the width of the original Northern Corridor (Figure 72) and makes low impact routing difficult

Figure 72: Northern Corridor: Agricultural Hot Spot 4 "Klein Rivier" Aerial

o Northern Corridor Hot Spot 5: Longmore Forest

The fifth agricultural hot spot identified along the Northern Corridor is located near the Longmore Forest Reserve (Figure 73). According to the cadastral information for the area, Farms Diepekloof and the Longmore Forest Reserve fall within this hot spot.

This hotspot is characterised by both high value agricultural infrastructure (centre pivots) and plantations. Parts of the Longmore Forest Reserve stretch the entire width of the Northern Corridor Alternative 1.

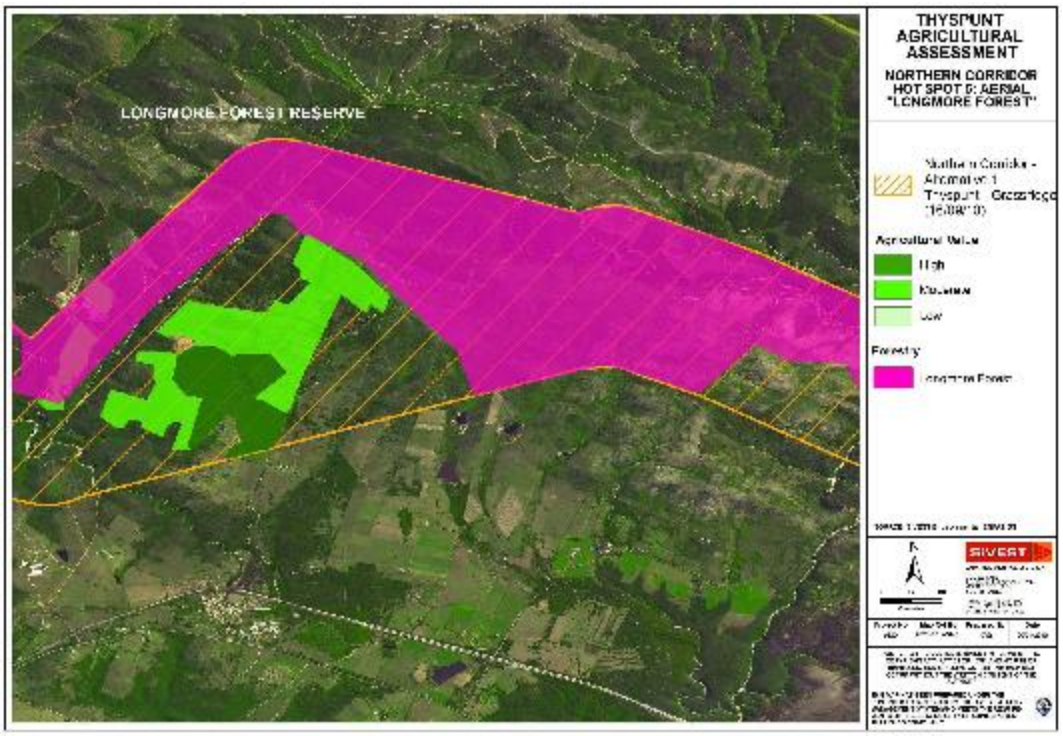


Figure 73: Northern Corridor: Agricultural Hot Spot 5 "Longmore Forest" Aerial

- Northern Corridor Hot Spot 6: Uitenhage

The sixth and final agricultural hot spot identified along the Northern Corridor is located west of Uitenhage. A number of farm portions under the name of Kruis Rivier are situated on either side of the Swartkops River, in a band parallel to the river. There are a number of relatively small farm portions in this area, particularly in the South-East portion of the corridor. This is an important factor as placing the transmission towers on these small farms could potentially cause a dramatic change in the farms' economic viability and production.

The farms in this area are characterised by intensive agricultural production with a focus on maize and vegetable production. These farms use a number of methods to irrigate including centre pivot, dragline and over head sprinkler systems (Figure 74).

Figure 74: An over head sprinkler system (Northern Hot Spot 6)

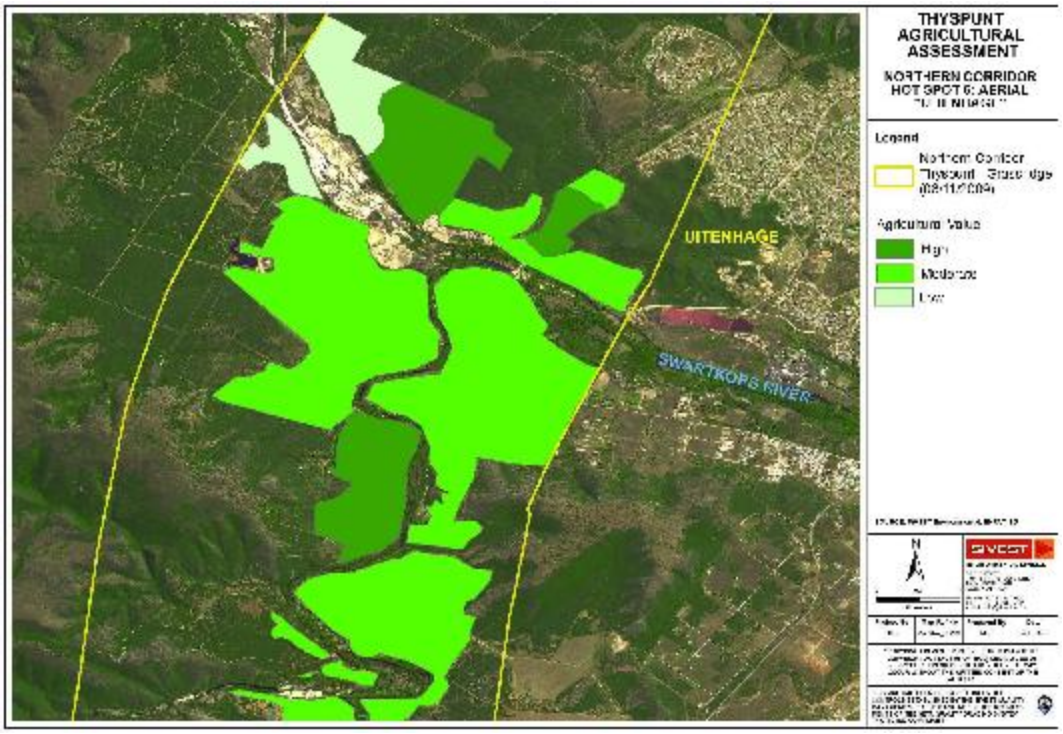


Figure 75: Northern Corridor: Agricultural Hot Spot 6 "Uitenhage" Aerial

- Forestry Hot Spots

According to a recent national land cover dataset (SANBI, 2009) forestry plantations influence various portions of the Northern Corridor. These areas have been delineated and include Longmore Forest Reserve. No matter which of the Northern Alternatives is selected the impact of crossing plantations, which span the entire width of the corridor remains (Figure 76).

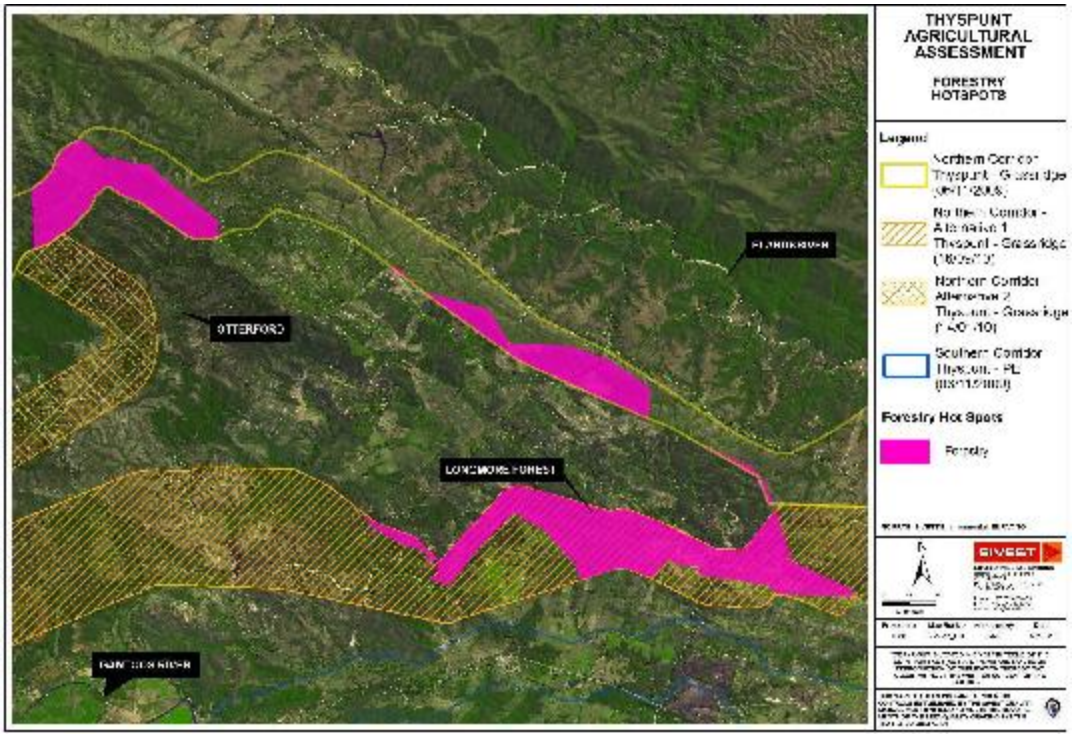


Figure 76: Forestry Hot Spots

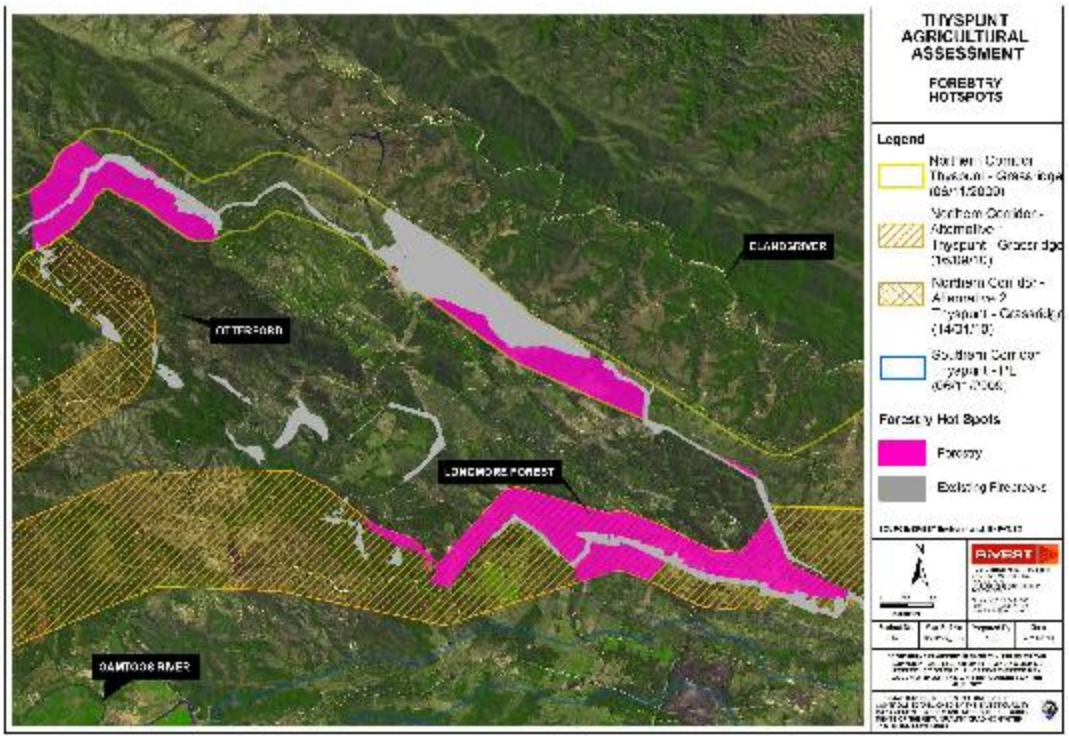


Figure 77: Forestry hot spots and existing firebreaks

The implications of the power lines on these areas of agricultural sensitivity are discussed in the impact assessment section below.

8 ELECTRIC AND MAGNETIC FIELDS

Transmission lines generate various levels of Electric and Magnetic fields (EMFs) as they convey electricity. The levels of radiation depend on the proximity to the lines and measures can be put in place to reduce radiation associated with these lines. Appendix 15 documents a thorough assessment of available information relating to EMFs. The EMF's associated with a Transmission line decrease as you move away from the centre line of the power line. Electrical field levels measured in the centre of a 400kV line indicated 4700V/m whilst they measured 1500V/m at the servitude boundary indicating a clear decrease in levels. Similarly magnetic field levels measured in the centre of a 400kV line indicated 10.5µT whilst the levels measured 2.5µT at the boundary of the servitude.

It is important to note that people are exposed to various levels of EMFs on a daily basis as general appliances in the home emit their own EMF levels while in use. Some of these levels can sometimes exceed the levels emitted by power lines.

An assessment of the various research that has been conducted indicates that ill health due to EMFs is possible in certain instances although it has not been conclusively proven. Evidence at this stage suggests that incidents recorded are more than likely the result of long term exposure to high levels of EMFs.

The recommendation for all Eskom infrastructure in South Africa is to apply the precautionary principle when constructing infrastructure which has EMFs associated with it. This essentially means that radiation levels have to be within the International Commission for Non-Ionising Radiation Protection (ICNIRP) guidelines and to keep permanent dwellings well away from power line servitudes. Eskom does not promote the establishment of dwellings under power lines or attempt to build power lines over existing dwellings wherever possible.

No compelling evidence exists to support claims of infertility, low milk production in livestock. Studies conducted could not conclusively prove that EMFs affect livestock productivity. Similarly studies on crop production beneath electrical infrastructure do not suggest adverse effects as a result of the power lines. It is important to note that agricultural activities can continue beneath a power line as no adverse effects on crops have been identified to date.

The guidelines for electric and magnetic field exposure set by the International Commission for Non-Ionising Radiation Protection (ICNIRP) receives world-wide support and are endorsed by the Department of Health in South Africa.

9 IMPACT ASSESSMENT

9.1 Methodology for Impact Assessment

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment (biophysical and social). The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

9.1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global, whereas Intensity is defined by the severity of the impact, for example, the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 26.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

9.1.2 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

- Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 25: Description of Rating System

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of

		minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).

4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY/ MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high

		costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria above (Minimum score of six, should the lowest value be scored for each and multiplied by 1 and a maximum value of 96 should the maximum value be scored for each and multiplied by highest intensity at 4) will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated

		adequately. These impacts could be considered "fatal flaw s".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

Table 26: Rating of impacts

IMPACT TABLE FORMAT		
Environmental Parameter	*A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water*	
Issue/Impact/Environmental Effect/Nature	*A brief description of the nature of the impact that is likely to affect the environmental aspect as a result of the proposed activity e.g. alteration of aquatic biota The environmental impact that is likely to positively or negatively affect the environment as a result of the proposed activity e.g. oil spill in surface water*	
Extent	*A brief description indicating the chances of the impact occurring*	
Probability	*A brief description of the ability of the environmental components recovery after a disturbance as a result of the proposed activity*	
Reversibility	*A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water*	
Irreplaceable loss of resources	*A brief description of the degree in which irreplaceable resources are likely to be lost*	
Duration	*A brief description of the amount of time the proposed activity is likely to take to its completion*	
Cumulative effect	*A brief description of whether the impact will be exacerbated as a result of the proposed activity*	
Intensity/magnitude	*A brief description of whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily*	
Significance Rating	*A brief description of the importance of an impact which in turn dictates the level of mitigation required*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	1
Probability	4	1
Reversibility	4	1
Irreplaceable loss	4	1

IMPACT TABLE FORMAT			
Duration		4	1
Cumulative effect		4	1
Intensity/magnitude		4	1
Significance rating		-96 (high negative)	-6 (low negative)
Mitigation measures	*Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. Describe how the mitigation measures have reduced/enhanced the impact with relevance to the impact criteria used in analysing the significance. These measures will be detailed in the EMP.*		

The 2010 regulations also specify that alternatives must be compared in terms of impact assessment.

9.2 Environmental Issues and Potential Impacts – Northern Corridor

9.2.1 Geology Assessment

In the geology report vulnerabilities and possible impacts on the environment have been discussed separately for each of the following layers: Please refer to the geology report for the methodology used to undertake these assessments:

- Geology;
- Hydrogeology;
- Land types;
- Soil depth;
- Clay percentage;
- Quarry potential;
- Slope.

- Geology

The geology of the area consists of mostly quartzitic sandstones, sandstones, mudstones, conglomerates, shales and siltstones, with appreciable amounts of terrace gravel, silcrete, ferricrete and aeolianite. Since the hardness, thickness, porosity, composition, density and specific gravity of these layers vary considerably; some layers are more susceptible for impacts than others.

The restriction terms and scores for geology are shown in Figure 78.

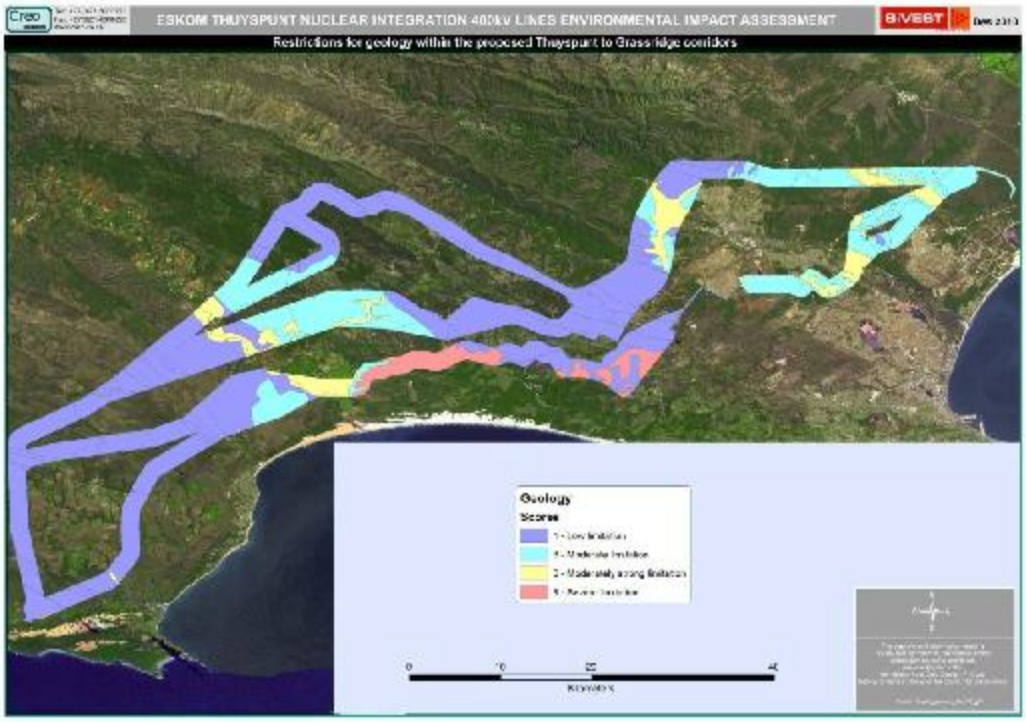


Figure 78: Restriction terms and scores for geology

Severe limitations are caused mainly by the presence of aeolianite, which can be described as lithified sediment which was deposited by aeolian processes (wind). Typically, the aeolianite of this region is characterized by overlying unconsolidated sands, with lithified sediments occurring deeper down.

The immediate vicinity of the Coega fault is also seen as a severe limitation, since neotectonic activity has been noted. The fault is located to the north of Motherwell and to the south-west of the Grassridge Substation, and traverses the low income (southern part) of the Coega Ridge proposed housing development. The fault could be hazardous for erected power lines if seismic activity were to occur along it. Therefore, a buffer of 300m on each side of the fault has been incorporated as precautionary measure.

Moderately strong limitations are mainly caused by the presence of alluvium, but also intermediate and low-level fluvial terrace gravel to a lesser extent. The above lithologies are susceptible mainly from an erosion and stability point of view during the construction phases. The rating system for the severe and moderately strong limitations is outlined in the following tables, as requested by SiVEST. The focus will be on the more important limitations as identified by Creo Design.

Table 27: Impact rating for geology

IMPACT TABLE FORMAT	
Environmental Parameter	Aeolianite, alluvium, intermediate and low-level fluvial terrace gravel, Coega fault
Issue/Impact/Environmental Effect/Nature	Erosion of the above layers during the construction/operation phases due to excavation. Destabilization of the country rock during construction phase that could cause unsightly scars and rock slides.
Extent	Site (1)
Probability	Probable (3)
Reversibility	Irreversible (4)
Irreplaceable loss of resources	Significant loss of resource (3)
Duration	Permanent (4)
Cumulative effect	Medium cumulative impact (3)
Intensity/magnitude	Medium (3)
Significance Rating	-54

	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	3
Reversibility	4	4
Irreplaceable loss	3	2
Duration	3	2
Cumulative effect	4	3
Intensity/magnitude	3	2
Significance rating	-54 (Negative High impact)	-30 (Negative Medium impact)

Mitigation measures	▪ Both erosion and destabilization can, to a degree, be addressed by minimizing disturbance of natural vegetation on the sites. ▪ Access routes should ideally be planned on areas less susceptible to erosion/destabilization/compaction or appropriate action should be taken to minimize impact, e.g. planning of new access routes along contour lines and minimizing of cutting and filling operations. ▪ Zones directly adjacent to Coega fault should be avoided if possible; otherwise undertake the required geotechnical investigations for towers placed in the 300m buffer zone around the fault.

- Land Types, Soil Depth and Clay Percentage

Three factors were considered in this category, viz. the properties of the individual land types, average soil depth, and average clay percentage. Since these three factors are intertwined, impacts on all will be described in this section.

With regards to the individual land types, freely drained, consolidated soil types without signs of wetness were deemed ideal. Limitations were usually encountered on shallow soils, unconsolidated sands, deep alluvial soils and rock outcrops. The restriction terms and scores for the land types are shown in Figure 79.

Generally, the land types show limited areas where severe and moderately strong limitations are found. Isolated patches are dominated by deep grey sands and the proposed actions in this area should take this limitation into account. Moderately strong limitations are, similar to the geology layer, dominated by deep alluvial soils, characteristic of valleys in this area. Rock outcrops and shallow soils tend to be restrictive in the northern corridor,
Given that the parameters, average soil depth and clay percentage, did not coincide well with the land types, these attributes have been plotted on their own. The restriction terms and scores for the average soil depths are shown in Figure 80.

Figure 79: Restriction terms and scores for land types

Figure 80: Restriction terms and scores for average soil depth

It is noticeable that the northern corridor has large areas restricted by shallower soils, defined as soils shallower than 500mm, Shallow soil depths would not only contribute more towards erosion hazards, but could also be problematic during the construction phase. Clay percentage, as shown in Figure 81, is another factor of importance.

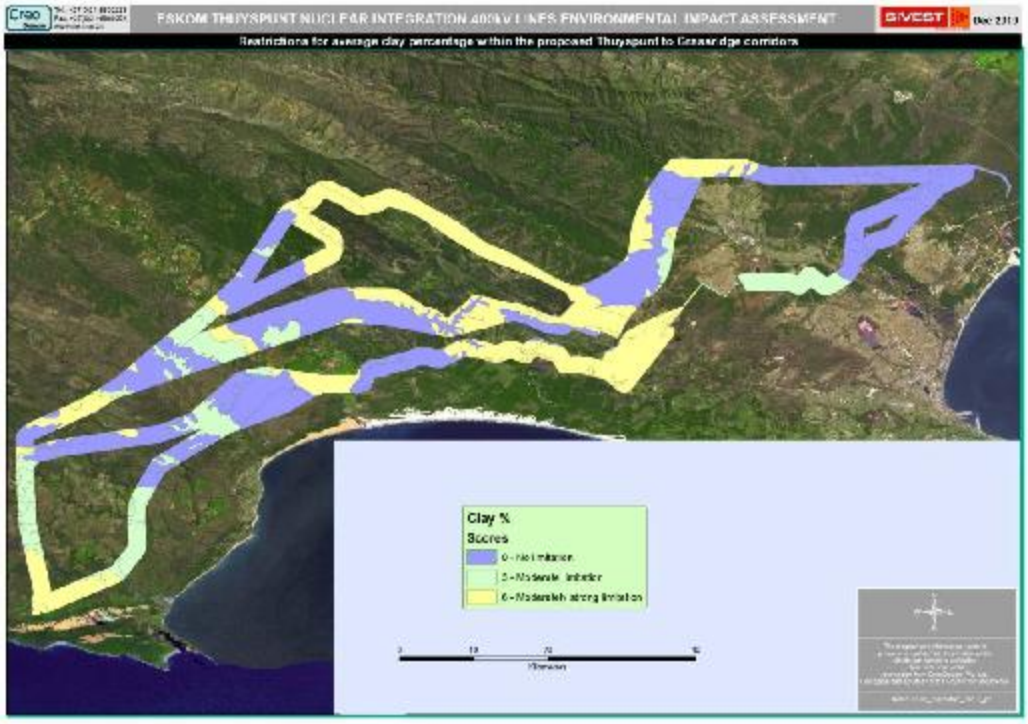


Figure 81: Restriction terms and scores for average clay percentage

Large areas within the corridors suffer from clay percentages below 10%, as shown by the moderately strong limitation class. Clay content is important to stabilize soils and impede soil erosion. The abundance of unconsolidated sands with low clay percentages are also shown in Figure 81. Soils with clay percentages between 20-30% were considered to have a moderate limitation, since difficulty during the construction and operational stages could be encountered.

Soils with high clay content have a high degree of shrinkage/swelling during drier and wetter times respectively. This trait is seen as not conducive during the construction and operational phases of the project. Soils containing clay content of 10-20% were considered not posing any limitations.

The importance of soil conservation, together with the significant impact that actions within these corridors could have on soils, necessitated the use of a number of parameters contained within the dataset. Of these, general land type information, average soil depth and average clay percentage were used in this exercise. However, the interaction between these attributes is of paramount importance and all three parameters were considered in a holistic approach during the final impact rating evaluation.

Noticeable impacts on the soils within the corridors would be the removal of vegetation and topsoil, and compaction of the topsoil, affecting soil formation processes, erosion and the siltation of lower-lying waterways and dams. These impacts are rated in Table 28.

Table 28: Impact rating for soils

IMPACT TABLE FORMAT		
Environmental Parameter	Vegetation and topsoil removal	
Issue/Impact/Environmental Effect/Nature	Removal of vegetation and topsoil during the construction phase leading to erosion, siltation, affecting soil formation processes, and soil compaction	
Extent	Local (2)	
Probability	Definite (4)	
Reversibility	Irreversible (4)	
Irreplaceable loss of resources	Significant loss of resource (3)	
Duration	Permanent (4)	
Cumulative effect Intensity/magnitude	High cumulative impact (4) High (3)	
Significance Rating	-63	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	3
Reversibility	4	2
Irreplaceable loss	3	2
Duration Cumulative effect	4 4	2 3
Intensity/magnitude	3	2
Significance rating	-63 (Negative High impact)	-28 (Negative Low impact)
Mitigation measures	▪ Keep disturbance sites to a minimum ▪ Rehabilitate soil and vegetation ▪ Implement effective erosion control measures ▪ Install silt fences ▪ Access routes should follow contour lines, avoid unconsolidated sands or sands with a low clay percentage, and steer clear of densely vegetated areas	

- Geohydrology

The main concern with regards to geohydrology would be pollution of the underlying aquifers due to activities in the area. Furthermore, presence of the Coega fault warrants special attention since the risk for pollution of the underlying fractured aquifers is increased. Lasting impacts from the proposed construction and operational activities on the aquifers were seen as minimal. Still, a number of considerations should be taken into account during the planning phase of the project:

- Depth to the aquifer is of importance since pollution would become more of a reality in shallower aquifers. Average soil depth should also be used as an indicator since shallower soils are often underlain by host rock. This could prove more problematic should the host rock have favourable attributes for good aquifer potential.

- Composition of the overlying soil would be essential to determine its buffering capacity in preventing pollutants entering an underlying aquifer. In this regard, unconsolidated sands and soils showing extensive signs of wetness would pose a greater limitation since their ability to prevent the movement of pollutants is low.

- Areas within the buffer of 300m surrounding the Coega fault should be avoided if possible.

Considering the above aspects, special care should be taken during the planning and construction phases of the project. The restriction terms and scores for geohydrology are shown in Figure 82.

Higher yielding fractured and intergranular aquifers are seen as moderate limitations for the project. The impact rating system on geohydrology is depicted in Table 29.

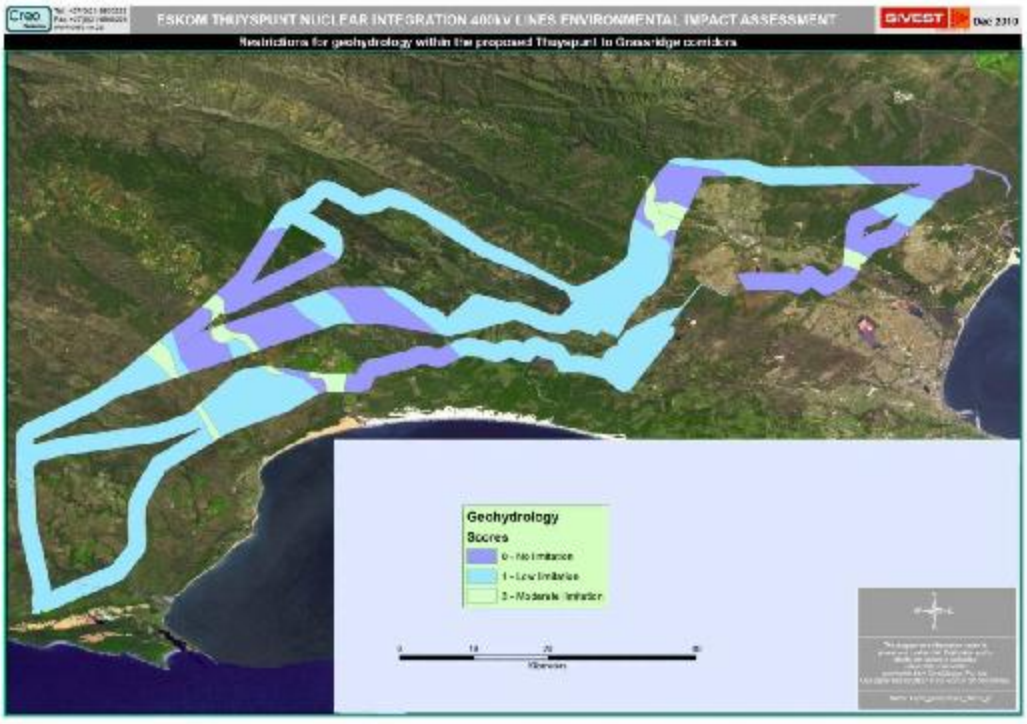


Figure 82: Restriction terms and scores for geohydrology

Table 29: Impact rating for geohydrology

IMPACT TABLE FORMAT		
Environmental Parameter	Aquifers	
Issue/Impact/Environmental Effect/Nature	Pollution of underlying aquifers during the construction phase	
Extent	District (2)	
Probability	Possible (2)	
Reversibility	Completely reversible (1)	
Irreplaceable loss of resources	Marginal loss of resource (2)	
Duration	Medium term (2)	
Cumulative effect	Low cumulative impact (2)	
Intensity/magnitude	Medium (2)	
Significance Rating	-22	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	2	1
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-22 (Negative Low impact)	-7 (Negative Low impact)
Mitigation measures	▪ Avoid higher yielding aquifers and shallow soils, underlain by rock types with favourable aquifer attributes ▪ Avoid areas in 300m buffer surrounding the Coega fault if possible; otherwise undertake the required geotechnical investigations for towers placed in this buffer zone.	

- Slope

Slope was considered one of the more important limitations during this exercise, mainly because of the potential erosion hazard it presented. Therefore, slopes above 20% were seen as a severe limitation, while slopes between 10-20% were considered moderate. As mentioned earlier, these guidelines were obtained from the Conservation of Agricultural Resources Act (DOA 1984). The restriction terms and scores for slope are shown in Figure 83.

First impressions from Figure 83 reveal that the central section of the Northern Corridor (affecting all alternatives within it) is severely limited by slopes exceeding the allowable 20% restriction,

making soil conservation measures of paramount importance. Large sections of these areas also suffer limitations in terms of shallow soils and low clay percentages, as shown by Figure 80 and Figure 81. The impact rating system for slope is depicted in Table 24.

Distinction is made between slopes steeper than 20% (severe limitation) and slopes of 10-20% (moderate limitation). Carefully planned soil conservation practices on moderately limited slopes could still provide feasible solutions, while very steep slopes would offer little to no potential for any activities.

Figure 83: Restriction terms and scores for slope

Table 30: Impact rating for slope

IMPACT TABLE FORMAT	
Environmental Parameter	Slope: 10-20%
Issue/Impact/Environmental Effect/Nature	Erosion of topsoil; siltation
Extent	Local (2)
Probability	Probable (3)
Reversibility	Irreversible (4)
Irreplaceable loss of resources	Significant loss of resources (3)
Duration	Medium term (2)
Cumulative effect	Medium cumulative impact (3)

IMPACT TABLE FORMAT		
Intensity/magnitude	Medium (2)	
Significance Rating	-34	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	4	4
Irreplaceable loss	3	2
Duration	2	1
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-34 (Negative Medium impact)	-13 (Negative Low impact)
Mitigation measures	▪ Keep disturbance sites to a minimum ▪ Rehabilitate soil and vegetation ▪ Implement effective erosion control measures ▪ Install silt fences ▪ Access routes should follow contour lines, avoid unconsolidated sands or sands with a low clay percentage, and steer clear of densely vegetated areas	
IMPACT TABLE FORMAT		
Environmental Parameter	Slope: >20%	
Issue/Impact/Environmental Effect/Nature	Erosion of topsoil; siltation	
Extent	Local (2)	
Probability	Probable (4)	
Reversibility	Irreversible (4)	
Irreplaceable loss of resources	Significant loss of resources (3)	
Duration	Medium term (2)	
Cumulative effect	Medium cumulative impact (3)	
Intensity/magnitude	High (3)	
Significance Rating	-54	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	3
Reversibility	4	4

IMPACT TABLE FORMAT		
Irreplaceable loss	3	2
Duration	2	2
Cumulative effect	3	2
Intensity/magnitude	3	2
Significance rating	-54 (Negative High impact)	-30 (Negative Medium impact)
Mitigation measures	▪ Avoid slopes >20% where possible ▪ Keep disturbance sites to a minimum ▪ Rehabilitate soil and vegetation ▪ Implement effective erosion control measures ▪ Install silt fences ▪ Access routes should follow contour lines, avoid unconsolidated sands or sands with a low clay percentage, and steer clear of densely vegetated areas	

9.2.1.1 Implications of the EIA Team-preferred alignment for Geology

The EIA Team-preferred alignment has been created by taking into consideration all relevant environmental parameters. Alternative 1 (the southern Longmore firebreak alternative) was indicated as the preferred corridor alternative for the Northern Corridor by the geological specialists. This situation has been somewhat complicated by the shifting of the Southern Corridor into this corridor and the shifting of the Northern Corridor in to the northern firebreak alternative. Although the Northern firebreak was not preferred by the geological specialists due to the presence of steep slopes, this was not seen as a fatal flaw, as engineering methods to stabilise tower positions and careful mitigation and planning under the auspices of the EMP in the construction and operation phase should minimise the risk of erosion. The geological specialists did not indicate any preferred alignment within the respective corridors.

In the context of the geological risks identified above, it is very important that the power line planning (especially relating to tower positioning) take into account the presence of steep slopes and soils with high and low clay percentages, with sufficient engineering and tower-specific mitigation measures put in place to minimise erosion.

The presence of the Coega Fault is critical and it is strongly recommended that a more focussed and detailed geotechnical investigation relating to tower positioning be undertaken when the tower positions in the vicinity of the fault are finalised.

9.2.2 Avifaunal Assessment

- General Description of bird interactions with Power lines

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds (and other animals) and birds colliding with power lines (Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, (Van Rooyen and Taylor 1999) and disturbance and habitat destruction during construction and maintenance activities.

- Collisions

Collisions are the biggest single threat posed by transmission lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of water birds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001).

Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. Most of the heavily affected species are Red Data species. The Red Data species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions.

Power lines are a major cause of avian mortality among power line sensitive species, especially Red Data species. Furthermore, the cumulative effects of power lines and other sources of unnatural mortality might only manifest itself decades later, when it might be too late to reverse the trend. It is therefore imperative to reduce any form of unnatural mortality in these species, regardless of how insignificant it might seem at the present moment in time.

It is anticipated that the most significant threat of the proposed power lines to birds will be collision. This is assessed in more detail below.

- Habitat destruction

During the construction phase and maintenance of power lines and substations, some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads, the clearing of servitudes and the levelling of substation yards. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can

result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through modification of habitat.

- Disturbance

Similarly, the above mentioned construction and maintenance activities impact on bird through disturbance, particularly during breeding activities.

- Nesting on towers (positive impact for birds)

Power lines very often represent suitable nesting substrate for many bird species, in particular in arid regions, where large trees may be absent. On the proposed power lines, the self-support towers will be the most suitable towers for nesting. Large eagles such as Martial and Verreauxs' Eagle have been recorded nesting on transmission lines in the Karoo region for several years now. For both Martial and Verreauxs' Eagles, the proposed power lines may present an opportunity for a range expansion, or an increase in density of breeding pairs in the study area.

- Impact of birds on quality of supply

Through the mechanisms described below, birds are able to cause electrical faults on power lines. The more faults that occur on a line, the lower the quality of electrical supply to the end customers and this impacts on Eskom's business

In the case of a bird streamer induced fault, the fault is caused by the bird releasing a "streamer" of faeces which can constitute an air gap intrusion between the conductor and the earthed structure. The fault appears to flash across the air gap and does not follow an insulator creepage path as observed on pollution faults.

Bird pollution is a form of pre-deposit pollution. A flashover occurs when an insulator string gets coated with pollutant, which compromises the insulation properties of the string. When the pollutant is wetted, the coating becomes conductive, insulation breakdown occurs and a flashover results.

Bird nests may also cause faults through nest material protruding and constituting an air gap intrusion. Crows in particular often incorporate wire and other conductive material into their nests. When nests cause flashovers, the nesting material may catch fire. This in turn can lead to equipment damage or a general veld fire. Apart from the cost of replacing damaged equipment, the resultant veld fire can lead to claims for damages from landowners.

Both bird streamers and bird pollution occurs as a result of birds perching on pylons or towers, often directly above live conductors. In the current study area where suitable trees are largely absent, birds are highly likely to perch on towers. However, the cross rope suspension tower

does not have suitable perching space above conductors and so should be unaffected. Self-support towers will be vulnerable as there is a cross arm which provides suitable perching space. These towers should make up a very small proportion of the total number of towers on the proposed lines.

- Identification of risk sources

    - Collision with overhead cables during operations

The following species are prone to be affected by collision with the proposed power line.

i. Blue Crane, Denham's Bustard, Black Stork, Secretarybird, White Stork, White-bellied Korhaan
ii. Assorted non Red Data species associated with water

Mitigation: All sections of line passing through or adjacent to (within one span of) the following areas must be fitted with a suitable marking device on the earth wires as per the existing Eskom Transmission technical guidelines. Marking transmission lines has been shown to significantly reduce the number of bird collisions. If the recommendations made here are comprehensively implemented, the threat of collision will be mitigated to a LOW negative significance.

i. Dams
ii. Irrigated arable lands
iii. Rivers and river crossings
iv. Flats or plains
v. Pans
vi. Wetlands

Whilst some of the above areas are easy to identify on the ground, one of the most important micro habitats i.e. flats or plains is much less easily recognised. Furthermore the various micro habitats often interact to produce a high risk situation. EWT have extensive experience on existing transmission lines and are capable of identifying the areas for marking. **It is recommended that an avifaunal "walk through" be conducted once the exact tower positions have been surveyed and pegged. The exact spans requiring marking will then be identified**. In addition, the standard Eskom line patrols (annual) will be used as a monitoring system to detect any collision with the line once operational. The avifaunal input into the Construction and Operational EMP will specify any detailed monitoring required for the operational phase of the line.

Table 31: Assessment of collision impact

IMPACT TABLE FORMAT

IMPACT TABLE FORMAT		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Collisions of birds with the earth wire	
Extent	Local/district- although collisions will occur on site the population will be affected locally	
Probability	Probable- From past experience the impact of collisions on a transmission line is judged to be probable	
Reversibility	Partly reversible- It is possible to mitigate for collisions but not fully	
Irreplaceable loss of resources	Significant- Birds die and thus this is a loss of resources	
Duration	Long term- the impact of collisions will continue for the lifetime of the project.	
Cumulative effect	Low- lines placed together actually help mitigate collision potential instead of compounding the impact	
Intensity/magnitude	Medium- The intensity of collisions is judged to be medium from past experience on transmission lines.	
Significance Rating	Medium negative before mitigation	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	2	2
Irreplaceable loss	3	3
Duration	3	3
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-30 (Medium negative)	-13 (low negative)
Mitigation measures	Mitigation measures for collisions will include fitting anti-collision marking devices onto spans that will be identified during the avifaunal specific walk down. This will be done once a final alignment has been chosen.	

- Habitat destruction during the construction and maintenance activities

The following species could be affected by habitat destruction:

  - Half-collared Kingfisher and Knysna Woodpecker

Mitigation: In the case of the Half-collared Kingfisher, riverine habitat is most important, and in the case of Knysna Woodpecker riverine and valley bushveld/thicket vegetation is important. Destruction of or impact on vegetation in these areas should be kept to an absolute minimum. The avifaunal walk through will identify specific sensitive areas and provide site specific recommendations if necessary. If the recommendations made here are implemented correctly, this impact could be reduced to LOW-MEDIUM significance.

Table 32: Assessment of Habitat Destruction Impact

IMPACT TABLE FORMAT		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Habitat destruction	
Extent	Site- habitat destruction will be confined to the site of the towers and substations	
Probability	Definite- habitat destruction will definitely take place	
Reversibility	Irreversible should no mitigation be put in place during construction	
Irreplaceable loss of resources	Complete loss should no mitigation be implemented	
Duration	Medium term- habitat will eventually recover	
Cumulative effect	High- multiple lines will mean a high cumulative impact	
Intensity/magnitude	High intensity should no mitigation be implemented	
Significance Rating	Mitigation can successfully reduce the impact of habitat destruction to an acceptable level.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	3
Reversibility	4	2
Irreplaceable loss	4	2
Duration	2	1
Cumulative effect	4	3
Intensity/magnitude	3	2
Significance rating	-57 (High negative)	-24 (Low negative)

IMPACT TABLE FORMAT	
Mitigation measures	Mitigation measures for habitat destruction will mainly focus on minimizing the impact of habitat destruction during the construction phase. Exact measures will be highlighted in the site specific EMP and will include measures such as using all existing roads, not clearing vegetation under the power lines as and when possible, etc.

- Disturbance during the construction and maintenance activities

The following species would be likely to be affected by disturbance:

i. Martial Eagle, Black Stork, Secretarybird, Black Harrier, African Crowned Eagle if breeding
ii. Half-collared Kingfisher, Knysna Woodpecker
iii. Assorted non Red Data large to medium raptors such as Verreauxs' Eagle

Mitigation: During the avifaunal "walk through" prior to construction, any nesting sites of the species mentioned above will be identified and case specific recommendations provided. The Environmental Control Officer should also identify any breeding birds along the servitude. These breeding sites can then be managed appropriately. As a general principle, construction and maintenance activities should take care to disturb the receiving environment as little as possible. Through implementation of the above it is envisaged that the disturbance impact of the proposed lines can be kept to LOW significance.

Table 33: Assessment of Disturbance Impact

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna
Issue/Impact/Environmental Effect/Nature	Disturbance
Extent	Site- disturbance should not affect further than the site
Probability	Probable- it is likely that some avifauna will be disturbed
Reversibility *Irreplaceable loss of resources*	Partly- once the construction stops the disturbance will be reduced a great deal Marginal- possible loss of resources due to nest abandonment etc
Duration	Short term- during construction
Cumulative effect	Medium- multiple power lines will result in an increase in disturbance during construction.
Intensity/magnitude	Medium- unless mitigation measures are followed

IMPACT TABLE FORMAT		
Significance Rating	Low - disturbance should not be a high impact on this project, provided mitigation is effective	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	2
Reversibility	2	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-24 (Low negative)	-8 (Low negative)
Mitigation measures	Any nesting sites of the species mentioned above will be identified during the EMP and case specific recommendations provided. The Environmental Control Officer should also identify any breeding birds along the servitude. These breeding sites can then be managed appropriately.	

- Impact of birds on quality of electrical supply

The following species could potentially impact on the proposed power lines quality of supply:

i. Martial Eagle on self-support towers (streamer)
ii. Non Red Data herons & Ibises on self-support towers (streamer & pollution)
iii. Assorted non Red Data, large to medium raptors such as Verreauxs' Eagle on self-support towers (streamer)
iv. Pied Crow, Black Crow & White-necked Raven on self-support towers (nesting)

Mitigation: All towers with available perching space (Self support and guyed V towers) above conductors, along the lines should be comprehensively fitted with Bird Guards as per the existing Eskom Transmission specifications. This will prevent birds from perching and roosting in the critical areas above live conductors and reduce this impact to LOW significance. In the case of nests, if problem nests are identified on the line once built, these should be managed according to the existing EWT Nest Management Guidelines. Eskom Transmissions standard monitoring of line performance will detect whether any bird related faulting is occurring once the line is operational.

Table 34: Assessment of Impact of Birds on the Quality of Supply

IMPACT TABLE FORMAT		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Faulting, which is bird induced	
Extent	Site- will occur only on tower affected	
Probability	Possible - past experience has shown faulting is possible on 400KV	
Reversibility	Reversible - fit bird guards will solve the problem	
Irreplaceable loss of resources	No - impact is a business quality of supply issue	
Duration	Life span of the power line	
Cumulative effect	Negligible	
Intensity/magnitude	Medium from a business case	
Significance Rating	Low and easy to mitigate	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	2	1
Significance rating	-18 (Low negative)	-8 (Low negative)
Mitigation measures	Fit bird guards to any self support or guyed V towers; can also be done reactively if faults are picked up.	

- Nesting of bird on towers (positive impact on birds)

The following species could potentially nest on the proposed power lines:

i. Martial Eagle on self-support towers
ii. Assorted non Red Data raptors such as Verreauxs' Eagle on self-support towers
iii. Pied Crow, Black Crow & White-necked Raven

Mitigation: None required

Table 35: Assessment of impact of nesting of birds

IMPACT TABLE FORMAT		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Nesting	
Extent	Site - confined to each tower	
Probability Reversibility	Probable - from past experience Not required	
Irreplaceable loss of resources	No	
Duration	Life time of project	
Cumulative effect	Negligible	
Intensity/magnitude Significance Rating	Low Not a significant problem, positive impact for birds	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	3
Reversibility	2	2
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	11 (Low positive)	11 (Low positive)
Mitigation measures	None required this is a positive impact for birds and does not affect the line performance.	

- Sensitive Areas

In addition to the micro-habitats identified above, the presence of any Important Bird Areas (IBAs) in the study area would be seen as important areas of habitat for birds. Accordingly the Kouga – Baviaanskloof IBA should be avoided by the corridor and alignment.

9.2.2.1 Implications of the EIA Team-preferred alignment for avifauna

The EIA Team-preferred alignment has been created by taking into consideration all relevant environmental parameters. Alternative 1 (the southern Longmore firebreak alternative) was indicated as the preferred corridor alternative for the Northern Corridor by the avifaunal specialists. This situation has been somewhat complicated by the shifting of the Southern Corridor into this corridor and the shifting of the Northern Corridor in to the northern firebreak alternative. Although the Northern firebreak was not preferred by the avifaunal specialists due to the presence of the Kouga – Baviaanskloof IBA (including the Stinkhoutberg Nature Reserve) and other factors such as the length of the route this was not seen as a fatal flaw, as careful mitigation and planning under the auspices of the Construction EMP in terms of route alignment and tower placement should reduce the risk associated with the power lines to birds. The EIA Team-preferred alignment runs to the east of the IBA and does not traverse it. The avifaunal specialists did not indicate any preferred alignment within the respective corridors as they stated it was more important for them to provide input in this regard during the CEMP stage.

The implications remain the same for the Revised EIA Team preferred alignment.

9.2.3 Surface Water Assessment

- Site Specific Impacts related to Wetlands, Sensitive Areas and mitigation measures

    - Wetlands Too Wide to be spanned

The Surface Water Specialist report has identified that most wetlands, rivers and drainage lines in the study area are able to be spanned by the proposed power lines. The average span between 2 sets of towers is 400m, and most surface water features are not as wide as this. This is due mainly to the hilly nature of the terrain which entails that most surface water features in the area take the form of river and drainage lines rather than wide valley bottom wetlands. In the larger river valleys, the incised nature of the valleys entails that the span can typically be even longer, as the vertical distance between the lines and the sides and bottom of the valley allows a sufficient level of clearance from the lines to allow the span to be wider. Typically a tower would be able to be placed on the lip of either side of the valley in this case.

Accordingly only one wetland along the Northern Corridor has been identified to be too wide to be spanned. This is a valley bottom wetland that extends from east to west across the entire width of the corridor to the north of the HV Yard and to the south of the Krom River valley. The figure below indicates that the wetland area across most of the corridor (including the extended latest revision of the corridor that is associated with the EIA Team-preferred route) is too wide to be singly spanned, even taking into account the height advantage (for ground clearance) presented

by the low ridge immediately to the north of the wetland. Only in the eastern-most parts of the corridor, where the wetland narrows and becomes much more (naturally) channelised, is the wetland able to be singly spanned. The width of the wetland as traversed by the proposed 3 Northern Corridor lines in the EIA Team-preferred alignment is approximately 950m, while the width of the wetland as traversed by the proposed 2 Southern Corridor lines is approximately 750m. At least one set of towers (3 in total for the Northern Corridor lines) is likely to have to be placed within the wetland area. However it must be noted that across this stretch, there may be areas of isolated non-hydric soils where the towers could be placed without technically being within a wetland.

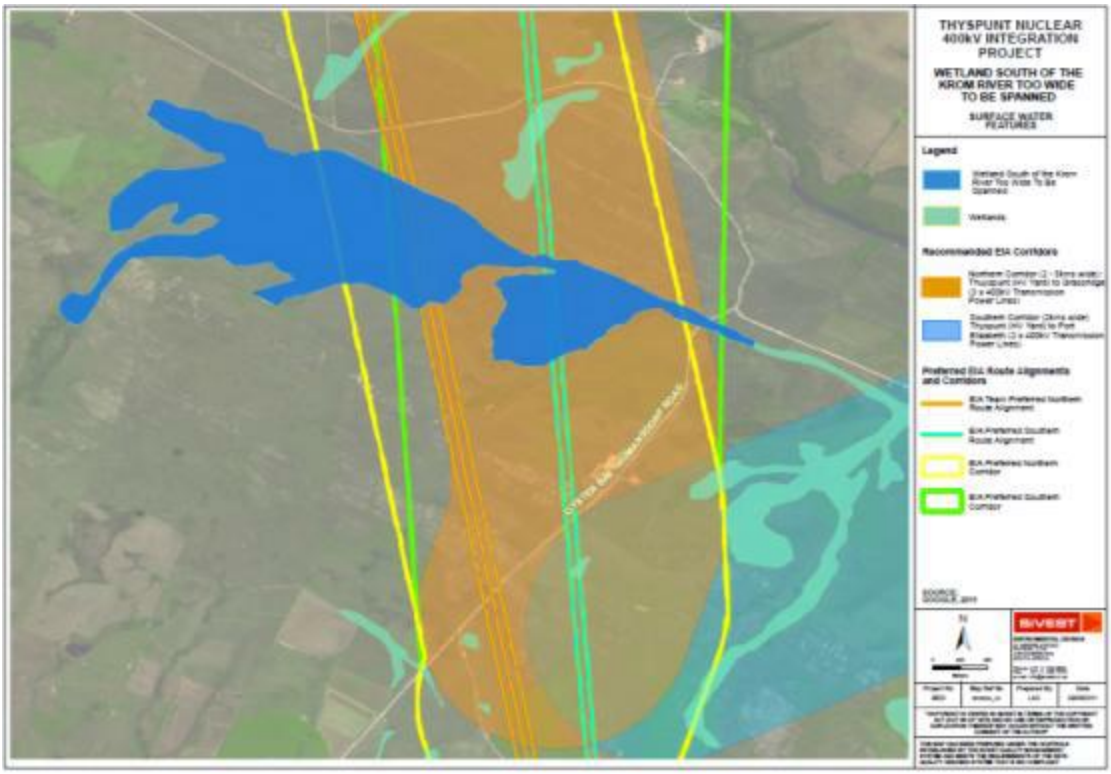


Figure 84: Wetland to the south of the Krom River that is too wide to be spanned

As mitigation for the potential impact of having to place towers in this wetland a wetland specialist must be appointed to undertake a wetland delineation of the proposed tower locations within the wetland south of the Krom River, to determine whether these occur within an area of hydric soils, and if so to recommend to the Eskom route planners where the towers could be placed without having to disturb the hydric soils by the excavation for the tower foundations.

- Further investigation of wetlands in the south-western parts of the study area

Although no other wetlands are too wide to be spanned, the presence of large areas of flat topography and the occurrence of predominant soil types with diagnostic wetland soil characteristics in the south-western part of the study area (between the HV Yard and the Gamtoos Valley) entails that the occurrence of wetlands is most likely in this part of the study area. Accordingly impacts on wetlands are most likely to occur here, and for this reason, one of the recommended mitigation measures discussed below relates to this area.

It is recommended that a wetland specialist be appointed to investigate all tower positions in the part of the finalised alignment between the HV Yard and the Gamtoos River for the occurrence of hydric soils. The first phase of this investigation would be a desktop investigation of the tower locations to determine whether any of these may be located within an area of hydric soils (i.e. within a wetland), or whether any may affect riparian habitat of a drainage line. The second phase may be a focussed field-based investigation of certain tower locations if any of these are marked for further investigation by the wetland specialist through the desktop examination of all tower location

- Sensitive Streams and Wetlands in the Longmore Forest and south of Humansdorp

The streams in the Longmore Forest Area are extremely sensitive due to the presence of the critically endangered Hewitt's Ghost Frog. In this context all rivers and streams within the Longmore Area must be treated as highly sensitive, as hitherto unidentified populations may occur in any of these water bodies. The disturbance of streams and rivers in the Longmore Area through the process of construction or operation of the proposed power lines could thus be highly detrimental to this species and could lead to significant impacts on the remaining population. The pollution of any river, stream or ephemeral drainage line in the Longmore area must be therefore avoided at all costs. Any watercourse must be treated as a strict no-go area for construction workers and there should be no interaction of any kind with such surface features. No storage area of any hazardous material should be stored closer than 200m from any watercourse or surface water feature. It is absolutely critical that no new construction vehicle accesses should be constructed across any watercourse, and the existing forestry operation access roads should be used. Where any tower location cannot be accessed by existing road / track access, the transport of construction materials by helicopters should be considered.

The creation of erosion and any resultant siltation into water courses must be avoided at all costs. Siltation and the creation of turbidity within these streams where suitable Ghost Frog habitat occurs could exert a significant adverse affect on the resource quality of the stream, and could lead to local population impacts. Erosion even in upstream catchments of suitable Ghost Frog

habitat could have a downstream impact on frog populations. The geotechnical study for this EIA has highlighted the high risk of erosion in the Longmore area due to the combination of very steep slopes and shallow soils. The prevention and control of any erosion, in particular in the vicinity of a water course must be strictly monitored and enforced and the EMP for the project must place a very large emphasis on erosion control and avoidance of all surface water features by construction teams.

Lastly the rivers in the area between the St Francis and Humansdorp potentially house sensitive amphibians. Accordingly all rivers in the area between Humansdorp and St Francis Bay must be spanned and treated as very sensitive to avoid impacting sensitive fauna and flora.

- Surface Water Resource Transmission Impact Assessment Tables

    - Foundation excavations of the Power line Pylons

The first potential impact that is evaluated addresses the possible placement of the foundations for the power line pylons within surface water resources encountered along the alignments. In order for the power line towers to be constructed, excavations will need to be made. Remembering that three lines are proposed to be constructed for the Northern Corridor, three foundations will need to be constructed within the servitude at each set of tower locations. If pylons need to be placed into wetlands (e.g. in the wetland south of the Krom discussed above) or other surface water resources (such as the banks of river and streams), the soils of these environments will need to be extracted in the foundation locations. This will involve impacts to the substrate of these environments as well as to the hydrology of these surface water features. Access of construction machinery into these environments could also damage the vegetation and underlying substrate. This action could be construed to be pollution under the National Water Act as it would entail the disturbance of the physical and biological characteristics of the water resource. As discussed below this activity would need to be licensed under the Act.

It should be noted that the placing and construction of a tower in surface water resources requires a licence from the Department of Water Affairs (DWA). The specified activities fall under one of the defined water uses under Section 21 of the National Water Act. Potential uses may include, but not limited to, the following:

- (c) impeding or diverting the flow of water in a watercourse;
- (i) altering the bed, banks, course or characteristics of a watercourse;

The construction of pylon foundations therefore has water use licence implications that would need to be addressed before the construction of these structures take place.

Table 36: Impact rating for impacts associated with the construction of the foundations for the power lines pylons into surface water resources.

IMPACT TABLE		
Environmental Parameter	Surface Water Resources (**Construction Phase**)	
Issue/Impact/Environmental Effect/Nature	Impact of pylon foundations being located within surface water resources	
Extent	Local	
Probability	Possible	
Reversibility *Irreplaceable loss of resources*	Partly reversible Marginal loss of resource	
Duration	Long term	
Cumulative effect	Medium cumulative Impact	
Intensity/magnitude	Medium	
Significance Rating	Pre-mitigation significance rating is negative and medium. With appropriate mitigation measures, the impact can be minimized but only to a limited extent. Post mitigation impact rating will remain negative but low.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	2	2
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	3	3
Intensity/magnitude	2	2
Significance rating	-30 (low negative impact)	-28 (low negative impact)
Mitigation measures	▪ The alignment should be planned to avoid crossing wide lengths of wetlands. ▪ A wetland specialist must be appointed to investigate whether tower positions in the wetland south of the Krom are placed in hydric soils ▪ If towers are to be placed in a wetland / surface water feature, when digging out the excavations the use and access of any vehicles (heavy or light) entering the affected surface water resource (for example wetlands) must be avoided where possible at all costs. ▪ In this case access must be limited to prevent unnecessary impact.	

	▪ Worker access into these sensitive areas also needs to be controlled.

o Inappropriate construction activities

The potential impacts that can be anticipated with general "inappropriate construction activities" that may need to take place either in or nearby surface water resources are addressed in Table 37. This umbrella term encompasses activities such as the physical destruction of surface water resources caused by humans, excavation and degradation of wetlands by construction machinery, leakage of oils and fuels from machinery, use of surface water resources for sanitary facilities and ablutions, unauthorized construction of access roads through surface water resources, extraction and destruction of vegetation in surface water resources and dumping of materials and litter into surface water resources, as well as (very importantly) erosion in the catchment of surface water resources and concomitant siltation. The cumulative impact of the above mentioned activities can result in significant negative effects and should be avoided at all costs where possible. The prevention of such inappropriate activities can be achieved in a number of ways. This is expanded on below.

Table 37: Impact rating for impacts associated with inappropriate construction activities.

IMPACT TABLE		
Environmental Parameter	Surface Water Resources (**Construction Phase**)	
Issue/Impact/Environmental Effect/Nature	Impact of inappropriate construction activities	
Extent	Local	
Probability	Possible	
Reversibility	Completely reversible	
Irreplaceable loss of resources	Marginal loss of resources	
Duration	Short term	
Cumulative effect	High cumulative impact	
Intensity/magnitude	Medium	
Significance Rating	Pre-mitigation significance rating is negative but low. Mitigation measures can adequately reduce this impact to negligible levels.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	1	1

Cumulative effect		4	1
Intensity/magnitude		2	1
Significance rating		-24 (low negative impact)	-7 (low negative impact)
Mitigation measures	▪ Where surface water resources are encountered, the construction area should be demarcated and a boundary from the construction area should be delineated. ▪ No access should be allowed into surface water resource areas. ▪ Oils and fuels must not enter or be stored in or nearby any surface water resources. ▪ Storage of fuels and oils should take place in the construction lay down area only. Moreover, re-fuelling must not take place in or nearby surface water resources. ▪ Vehicle maintenance is central to reducing the leakage of oils caused by construction machinery. Vehicles need to be inspected before going to undertake any construction activities. ▪ Limited sanitation and ablution facilities will be required for the relatively small task team responsible for the construction of the power lines near or in surface water resources. These facilities must be sufficiently maintained and distanced from any surface water resource. An appropriate distance usually ranges from 100-200metres away from sensitive environments. Refuse bins must be available to accommodate any waste generated as a result of construction activities generated near surface water resources.		

The streams in the Longmore Forest Area are extremely sensitive due to the presence of the critically endangered Hewitt's Ghost Frog. Inappropriate construction practices could significantly affect the habitat for the frog. Suitable mitigation measures are discussed above.

o Access through surface water resources

As a general principle, no new construction / operational access into any water resource should occur unless absolutely necessary and unavoidable. Existing access routes across water resources would thus need to be utilised. The Construction EMP should address all such surface water crossings, and the construction engineers and the construction environmental team should examine these crossings to assess whether they need to be upgraded to accommodate construction traffic or to reduce the potential for construction traffic to impact on the crossing. Mitigation measures are stipulated in Table 38 below.

Table 38 - Impact rating for impacts associated with access routes into surface water resources.

IMPACT TABLE		
Environmental Parameter	Surface Water Resources (**Construction Phase**)	
Issue/Impact/Environmental Effect/Nature	Impact of access through surface water resources	
Extent	Site	
Probability	Unlikely	
Reversibility *Irreplaceable loss of resources*	Partly reversible No loss of resource	
Duration	Short term	
Cumulative effect *Intensity/magnitude*	High cumulative impact Medium	
Significance Rating	Pre-mitigation significance rating is negative but low. Mitigation measures can adequately prevent impact where implemented.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	4	2
Intensity/magnitude	2	2
Significance rating	-20 (low negative impact)	-14 (low negative impact)
Mitigation measures	▪ Where access routes through surface water resources are required a planned access route should be approved under the CEMP prior to any access into sensitive areas being undertaken. ▪ The exposed surfaces of the roads must be accompanied by supplementary mitigation measures. Storm water management measures will need to accompany roads leading into surface water resources. Such measures can include the use of soil stabilizers that prevent soil from washing away. Alternatively, gravel can be used for the access surface. This will have to be cleared once construction is complete will require rehabilitation (see below). ▪ **IMPORTANT:** The final wetland walk-down assessment report will need to identify wetlands where such access will be required for construction. Where the specialist anticipates significant structural damage to the surface water resource(s), a rehabilitation plan will	

		be required and implemented upon completion of the construction activity to address the impacts caused. Additionally, the final walk-down assessment should identify where any sensitive vegetation species exist in the affected surface water resources. Should sensitive species be identified, plant translocation may be required and the relevant authority overseeing this operation will need to be contacted. Vegetation rehabilitation will be required to address the temporary damage. This can either form part of the rehabilitation plan referred to above or it can be a stand-alone assessment.

- Operational activity impacts

Potential impacts on surface water resources may result during the operational phase of the project. These would relate mainly to the residual impacts that arose during the construction phase, operational maintenance activities as well as the inadequate rehabilitation of construction-related access. It is vital that any surface water resources (relating mainly to affected wetlands), that have been damaged or degraded, are rehabilitated to an acceptable and functional level. Mitigation measures to address potential impacts that may result in the operational phase are elaborated on in Table 39 below.

Table 39: Impact rating for impacts associated with the residual effects of the construction phase and inadequate rehabilitation of affected surface water resources.

IMPACT TABLE		
Environmental Parameter	Surface Water Resources (**Operation Phase**)	
Issue/Impact/Environmental Effect/Nature	Impact of operational activities	
Extent	Site	
Probability	Unlikely	
Reversibility	Completely reversible	
Irreplaceable loss of resources	Marginal loss of resources	
Duration	Short term	
Cumulative effect	Low cumulative effect	
Intensity/magnitude	Medium	
Significance Rating	Pre-mitigation significance rating is negative but low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	1	1
Reversibility	1	1
Irreplaceable loss	2	1

Duration		1	1
Cumulative effect		2	1
Intensity/magnitude		2	1
Significance rating		-16 (low negative impact)	-7 (low negative impact)
Mitigation measures	▪ Implementing an auditing process for the duration of the rehabilitation plan is critical towards safeguarding the integrity of any affected surface water resources. The audit process should be founded on rigorous procedures to maintain compliance with mitigation measures and rehabilitation goals and objectives. ▪ Eskom have a set of procedures and guidelines that are followed in order to mitigate any impact with regards to maintenance. Guidelines in terms of transmission vegetation management for example are available and must be implemented assist with the mitigation of any potential impact that could result from operational maintenance.		

- Potential Impacts associated with the upgrading of the Grassridge and Dedisa substations.

The upgrading of the Grassridge and Dedisa Substations are likely to be associated with the associated infrastructure required to integrate the proposed new substation into Eskom's Electricity Transmission grid (including the construction of service/access roads, the construction of extra lighting towers at the substation sites, etc). Additional feeder bays will also be required to accommodate additional lines. Importantly, it is understood that the footprint will remain that same. Therefore, no impact is expected to occur on the surface water features nearby the respective substations.

9.2.3.1 Implications of the EIA Team-preferred alignment for Surface Water features

The EIA Team-preferred alignment has been created by taking into consideration all relevant environmental parameters. No preferred alternatives within the Northern Corridor were indicated by the surface water specialists due to the ability to span all of the surface water features and drainage lines in this mountainous and incised terrain. This lack of preference fits in very well with the shifting of the Southern Corridor into the Northern Corridor southern firebreak alternative and the shifting of the Northern Corridor in to the northern firebreak alternative.

A preferred alignment was provided by the surface water specialists (for both alternatives) within the Northern Corridor. This optimal alignment from a surface water perspective roughly corresponds with the EIA Team-preferred route for the Northern Corridor, except in areas (e.g. the Honeyville area) where the corridors have shifted since the creation of the EIA Team